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Second Five-Year Review Report

for
McGraw Edison Corporation
Albion, Michigan
October, 2004

PREPARED BY:

U. S. EPA - REGION 5

Approved by:



Richard C. Karl
Director, Superfund Division

10-27-04
Date

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Table of Contents

List of Acronyms	5
Executive Summary	7
Five-Year Review Summary Form	8
I. Introduction	12
II. Site Chronology	13
III. Background	14
Physical Characteristics	14
Land and Resource Use	14
History of Contamination	14
Initial Response	14
Basis for Taking Action	15
IV. Remedial Actions.....	16
Remedy Selection	16
Remedy Implementation	16
System Operations/Operation and Maintenance (O&M)	17
V. Progress Since the Last Five-Year Review	17
VI. Five-Year Review Process	19
Administrative Components	19
Community Notification and Involvement	19
Document Review.....	20
Data Review.....	20
Site Inspection.....	20
Interviews.....	23
VII. Technical Assessment.....	24
Question A: Is the remedy functioning as intended by the decision documents?.....	24
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?.....	24
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?.....	25
Technical Assessment Summary.....	24
VIII. Issues.....	25
IX. Recommendations and Follow-up Actions.....	25

X. Protectiveness Statement(s)	26
---------------------------------------------	----

XI. Next Review	27
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Tables

Table 1 - Chronology of Site Events
Table 2 - Annual System Operations/O&M Costs
Table 3 - Issues
Table 4 - Recommendations and Follow-up Actions

Attachments

Figure 1 Site Map
Figure 2 Shallow Aquifer zone
Figure 3 Interface Aquifer Zone
Figure 4 Bedrock Aquifer Zone
Figure 5 Shallow Aquifer Zone
Figures 6 Interface Aquifer Zone
Figures 7 Bedrock Aquifer Zone
Table 1 Groundwater Sampling Locations
Table 2 Summary of Groundwater Elevations
Table 3 Summary of Analytical Results
Table 4 Summary of Analytical Results
Table 5 Summary of Analytical Results
Table 6 Summary of Analytical Results
Table 7 Summary of Mass Removal from the Aquifers
Appendix D Time-Trend Plots
Appendix E Mass Removal Plots

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
EPA	United States Environmental Protection Agency
FSR	Final Site Remedy
HRL	Health Risk Limit
GCL	Geosynthetic Clay Liner
GWOU	Groundwater Operable Unit
MCL	Maximum Contaminant Limit
MHEQ	Michigan Department of Environmental Quality
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NOC	Notice of Compliance
O & M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCOR	Preliminary Close Out Report
PRP	Potentially Responsible Party
PSFD	Pilot Scale Field Demonstration
RA	Remedial Action

RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SCOU	Source Control Operable Unit
VOC	Volatile Organic Compounds

Executive Summary

A Consent Decree (CD) between the State of Michigan and McGraw Edison was entered with the Calhoun County Circuit Court on June 11, 1984. Subsequently, this site and the rest of McGraw Edison were purchased by Cooper Industries (Cooper) of Houston, Texas. Some residents whose wells were contaminated by this site have been placed on municipal water supply paid for by McGraw Edison. A hydrogeologic study of the site was completed by McGraw Edison, which resulted in the installation of both deep and shallow aquifer groundwater purging and treatment systems as well as a soil flushing system. A "former-well" is being used to purge the bedrock aquifer of contaminants. A number of shallow purge wells have been installed in several phases to purge the upper contaminated aquifer. McGraw Edison and the MDEQ are continuing to evaluate the effectiveness of the system. The purged groundwater is treated via activated carbon and air stripping and then discharged to the Kalamazoo River.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): McGraw Edison Corp.		
EPA ID (from WasteLAN): MID005339676		
Region: 5	State: MI	City/County: Calhoun
SITE STATUS		
NPL status: Final <input checked="" type="checkbox"/> Deleted Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* YES <input checked="" type="checkbox"/> NO	Construction completion date: 1/28/1998	
Has site been put into reuse? X YES NO		
REVIEW STATUS		
Lead agency: EPA <input checked="" type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency <input type="checkbox"/>		
Author name: Gladys Beard		
Author title: NPL State Deletion Process Manager	Author affiliation: U. S. EPA, Region 5	
Review period:** 07/06/2004 to 10/29/2004		
Date(s) of site inspection: 08/09/2004		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input checked="" type="checkbox"/> NPL State/Tribe-lead </div> <div style="margin-top: 5px;"><input type="checkbox"/> Regional Discretion</div>		
Review number: (first) <input checked="" type="checkbox"/> (second) <input type="checkbox"/> (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report </div> <div style="margin-top: 5px;"><input type="checkbox"/> Other (specify) _____</div>		
Triggering action date (from WasteLAN): 10 /29 /1999		
Due date (five years after triggering action date): 10 /29 /2004		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

FIVE-YEAR-REVIEW SUMMARYS FORM, contd.

Issues:

Elevated concentrations of TCE detected in the soils beneath the northeast portion of the building need to be addressed. Soil samples taken from location MB-1B exceed the soil volatilization to indoor air criteria.

Install additional monitoring wells at the three locations where data gaps exist.

Investigate the elevated concentrations of contaminants occurring in peripheral wells B-42S and B-125D.

Eliminate the removal of monitoring wells from the network.

Perform a residential well inventory in the area where residences were offered municipal water hook-up.

Provide a regular maintenance schedule of the extraction/monitoring wells using MDEQ pre-approved cleaning procedures.

Recommendations and Follow-up Actions:

The following are the Michigan Department of Environmental Quality's (MDEQ) recommendations for the 2004 Five-Year Review of the McGraw-Edison Superfund site.

1. *Elevated concentrations of trichloroethylene in the soil detected beneath the northeast portion of the building need to be addressed.*

MDEQ staff reviewed the December 2003 and April 2004 Soil and Groundwater Sampling results. It is apparent from the data presented that there are several locations in the area of investigation that showed levels of contaminants exceeding criteria, notably the northeast corner of the building (MB-18, MB-8, MB-1, MB-2, MB-9)(see Figure 1 in Attachments) and the loading dock area (MB-11 and MB-17). Cooper Industries informed the MDEQ that the soils near the loading dock area will be addressed. The MDEQ recommends that Cooper Industries address the soil and groundwater contamination in all areas that Michigan exceed criteria under Part 201 of the Natural Resources and Environmental Protection Act.

2. Install additional monitoring wells where data gaps exist. Additional monitoring wells are needed at three locations in areas of concern where capture of contaminated groundwater has not been clearly demonstrated.

There are outstanding issues from the last five-year review (October, 1999) that Cooper Industries

has yet to fulfill. Page 5, second paragraph of the last five-year review report states that “Additional monitoring wells are needed in areas of concern where capture of the contaminated water has not been clearly demonstrated.” There are three locations where data gaps exist and additional wells are required; near the intersection of Barnes Street and Clark Street, near monitoring well B-49S and south of well B-41S. Geoprobe work completed by Cooper Industries in 1999 or 2000 showed that there did not appear to be contamination in shallow aquifer groundwater in the areas of the temporary borings on Linwood Avenue. The investigation did not penetrate the bedrock surface, so there is no evidence of a lack of groundwater contamination in the bedrock aquifer in these areas. There are no bedrock aquifer wells in these areas to confirm hydraulic containment of the contaminant plume. The MDEQ is still concerned with the containment of the shallow aquifer contaminant plume due south of well B-46S. The data from the existing wells is not conclusive. The MDEQ recommends additional well clusters to be installed to make certain the plume has been captured. The concentration of contaminants versus time plots for wells down gradient and outside the capture zone (B-46S, B-47S) indicates elevated concentrations of contaminants with time (Figure 2). If these wells are outside the capture zone, the concentration of contaminants should go down with time, but this has not occurred until recently (1998-2003 for B-46S). Monitoring well B-47S indicated a decrease in concentration from 1994 to 1998, but is indicating a moderate increase from 1999 to 2004.

3. Investigate the elevated concentrations of contaminants occurring in peripheral wells.

Two monitoring wells (B-42S and B-125D) indicated elevated concentrations of contaminants (trichloroethylene, perchloroethene, and vinyl chloride (Figure 3)). Cooper Industries states that the wells have been impacted from offsite sources (B-42S – Brooks Foundry; B-125D – Albion Industries). The MDEQ recommends that Cooper Industries investigate the source of this contamination to substantiate the claim that the contamination is from an offsite source and not from the McGraw-Edison site.

4. Eliminate the removal of monitoring wells from the network. In order for the MDEQ to verify hydraulic containment, the monitoring well network must remain intact and wells located near the perimeter of known groundwater contamination and/or near the extent of groundwater capture must remain in the groundwater sampling network. Perimeter (sentinel) monitoring wells must not be dropped from the sampling network. These wells are the most critical to demonstrating that the contaminant plume has been contained.

5. Perform a residential well inventory in the area where residences were offered municipal water-supply hook-up. Provide documentation that a residence is either:

- On municipal water and does have a residential well.
- On municipal water and has a residential well, or
- Has a residential well for source of drinking water.

If residences are found with wells, include the sampling of the residential well as part of the long-

term monitoring.

In the early 1980s, residential wells located along Michigan Avenue, Linwood Avenue, and Bushong (located down gradient from the site) were sampled for volatile organic compounds (VOCs). Results indicated that VOCs were detected in a number of residential wells. At some later date, municipal water was offered to these and other residences in the area. A residence can be offered to hook-up to municipal water, but is not obligated. There are instances where this occurs and continues to occur within the State of Michigan. A follow-up as to which residences were hooked-up and those that have residential wells as a source of water needs to be conducted.

6. Provide a regular maintenance schedule of the extraction/monitoring wells using well cleaning procedures pre-approved by the MDEQ.

The wells need to be maintained on a regular basis to decrease biofouling and blockage of the wells thereby increasing the efficiency and performance of the system.

7. The MDEQ needs to evaluate Cooper Industries' "Proposed Deep Aquifer Groundwater Extraction Rate Optimization Plan" submittal.

Cooper Industries just submitted a proposal for MDEQ to evaluate the deep aquifer pumping well to determine if the well can be pumped at a lower rate. Cooper Industries needs to evaluate the impact of turning off the deep well. Cooper Industries would have to conclusively demonstrate that reducing or eliminating pumping from the bedrock well will not release part of the shallow contaminant plume. This may require a revision of the monitoring system and/or and expansion of the shallow aquifer extraction well system.

Protectiveness Statement(s):

All immediate threats at the site have been addressed with the exception of contaminated soil at the footprint of the building, and the remedy is expected to be protective of human health and the environment upon attainment of remedial objectives and groundwater standards.

Long-Term Protectiveness:

Long-term protectiveness at the McGraw Edison Corp. Superfund site will be achieved by continuing the long-term monitoring of the groundwater system. Long-term groundwater monitoring indicates that the concentrations of the chemicals of concern have a declining trend.

Other Comments: None.

MCGRAW-EDISON CORPORATIONS SITE
Albion, Michigan
Second Five-Year Review Report

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 (c) and the National Contingency Plan (NCP). CERCLA §121 (c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The Michigan Department of Environmental Quality (MDEQ) and the United States Environmental Protection Agency (EPA), Region 5, conducted the five-year review of the remedy implemented at the Site. This review was conducted by the Project Managers for the entire site from July 2004 through October 2004. This report documents the results of the review.

This is the second five-year review for the Site. The triggering action for this five-year review is the completion of the first Five-Year Review in October 1999. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
Removal Assessment	11/28/1989
Removal Assessment	06/04/1992
PRP Search	09/30/19998
Stipulation and Order to Remediation	06/07/1985
Consent Decree	06/11/1984
Consent Decree Amended	03/2001
Final on the NPL	09/08/1983
Remedial Start	07/07/1990
Remedial Action	07/07/1997
Preliminary Close Out Report	07/07/1997
Five Year Review Report	10/29/1999

II. Background

Physical Characteristics

The former McGraw-Edison facility is located in Albion, Michigan (figure1). The objective of groundwater monitoring at the site is to evaluate the effectiveness of the groundwater recovery and treatment systems in addressing a plume of predominantly trichloroethylene (TCE) in the shallow and deep aquifers at the Site. The Site occupies approximately 24 acres surrounded by mixed industrial residential properties. Beginning in 1980, investigations found extensive contamination in soil and groundwater of TCE and other volatile organic compounds (VOCs). Two on-site wells, the Clark Street municipal wells, and 45 private residence wells were also found to contain TCE.

Land and Resource Use

The company manufactured air conditioners, humidifiers, and similar equipment until it closed in 1980. From 1970 to 1980, "still bottoms" (an oil waste) contaminated with trichloroethylene (TCE) were spread on the site's dirt road to control dust. TCE was found in two on-site water supply wells and 45 nearby residential wells in 1980. Nearby Albion municipal wells also showed TCE contamination in the past. The municipal water supply has been extended to all affected residents; however, several residents refused hookup. In 1997, Cooper Industries sold the subject site to Patriot Industries, which is owned by two local businessmen. Patriot Industries manufactures and assembles satellite dish components. Reportedly, Patriot Industries currently employs approximately 130 people and hopes to expand its work force over the next few years. This Site has been in reuse for some time now.

History of Contamination

Under the CD and the Hydrogeologic and Soil Order, McGraw-Edison was required to perform a hydrogeologic study and submit a report which defined the nature of vertical and horizontal extent of groundwater contamination in the vicinity of the site. Additional information requirements included the direction and rate of movement in the groundwater in both the drift and bedrock aquifers.

Cooper Industries (Cooper), and their predecessor, McGraw-Edison, have collectively operated and maintained the recovery system at the former McGraw-Edison facility located in Albion, Michigan for the past +15 years. The system extracts groundwater from a shallow and deep aquifer to capture and remove volatile organic compounds (VOCs) in the groundwater. Currently, nearly 80 to 90 times more groundwater is removed from the deep aquifer than from the shallow aquifer, while the concentrations of VOCs are 200 times lower in the deep aquifer than in the shallow aquifer.

Initial Response

On June 7, 1985, a stipulation and order regarding a hydrogeologic and soil contamination study was issued as required by the CD. The objective of the soil investigation was to identify and characterize all contaminated soils at the Site. The objective was accomplished and is documented in the Soils Investigation and Assessment Final Report.

In the Spring of 1995 verification sampling of soils was conducted to monitor the effectiveness of the soil flushing system in removing TCE from site soil as stipulated in the CD and the Stipulation and Order to Remediation (SOIFR). The verification sampling indicated the soil flushing system was effective in remediating two areas to concentrations below 10 parts per billion (ppb), another area to concentrations below 100 ppb, and significantly reduced TCE concentrations in the fourth area. It was determined that soil flushing should continue in the fourth area and verification sampling undertaken at a later date. In the Spring of 1997, verification sampling of soils was conducted to monitor the effectiveness of the soil flushing system in removing TCE from the soils in the remaining soil flushing area. The verification sampling and a statistical evaluation of the data indicated that the soil flushing system was effective in reducing the concentrations to acceptable levels, and closure of the soil-flushing unit was approved in October 1997. In addition, the MDEQ's Surface Water Quality and Air Quality Divisions approved a modification to remove the activated carbon system from the treatment system as requested by Cooper. Currently, purged groundwater is treated by air stripping and then discharged to the Kalamazoo River in accordance with the Air Quality Discharge and National Pollutant Discharge Elimination System (NPDES) permits. The groundwater purge and treatment systems have continued to operate and are monitored in accordance with the CD.

Basis for Taking Action

Contaminants

Hazardous substances that have been released at the Site in each media included:

Soil and Groundwater

Acetone	Dibromochloromethane	Styrene
Benzene	1,1-Dichloroethane	1,1,2,2-Tetrachloroethane
Bromodichloromethane	1,2-Dichloroethane	Tetrachloroethene
Bromoform	1,1-Dichloroethene	Toluene
Bromomethane	cis-1,2-Dichloroethene	1,1,1-Trichloroethane
Benzene	trans-1,2-dichloroethene	1,1,1-Trichloroethane
Bromodichloromethane	1,2-Dichloropropane	1,1,2-Trichloroethane

Toluene	cis1,3-Dichloropropene	Trichloroethene
2-Butanone	Ethylbenzene	Vinyl chloride
Chloroethane	2-Hexanone	m,p-Xylene
Carbon Disulfide	4-Methyl-2-pentanone	o-xylene
Carbon Tetrachloride	Methylene chloride	
Chlorobenzene	1,1,2,2-Tetrachloroethane	

IV. Remedial Actions

Remedy Selection

A Consent Decree (CD) between the State of Michigan and McGraw Edison was entered with the Calhoun County Circuit Court on June 11, 1984. The CD was the decision document between McGraw Edison and the State of Michigan. Subsequently, this site and the rest of McGraw Edison were purchased by Cooper Industries (Cooper) of Houston, Texas. Residents whose wells were contaminated by this site have been placed on municipal water supply paid for by McGraw Edison. In accordance with the CD, McGraw Edison paid \$250,000 to the State for its costs, and a \$150,000 trust account was set up for economic development. A hydrogeologic study of the site was completed by McGraw Edison, which resulted in the installation of both deep and shallow aquifer groundwater purging and treatment systems as well as a soil flushing system. A former "fire-well" was used to purge the bedrock aquifer of contaminants. A number of shallow purge wells have been installed in several phases to purge the upper contaminated aquifer. McGraw Edison and the MDEQ are continuing to evaluate the effectiveness of the system. The purged groundwater was treated via activated carbon and air stripping and then discharged to the Kalamazoo River.

Remedy Implementation

A. Soil Removal

Since the CD was signed and January 18, 1980 cubic yards of contaminated soil have been removed from the site and disposed of in an approved facility from the following areas: 1) within the Fire Protection Pit; 2) under the Drum Storage Area; and a 3) segment of roadway on-site. The soil in these areas meets Part 201 soil standards based on industrial use, however restrictive covenants are not in place. Pockets of remaining soil contamination that were left at the roadway and under the Drum Storage Area were treated by the soil flushing system as provided in the CD.

B. Soil Flushing

"Soil Flushing" is a process in which water is used to wash contaminants from the soil into the

groundwater. The groundwater is then extracted and treated to remove the contaminants. A soil flushing system was installed to address the remaining areas of soil contamination. This system utilized excess effluent from the air stripping treatment system to flush TCE from soils into the shallow aquifer where it was purged by the shallow aquifer extraction system. Using sprinkler heads, treated water was uniformly distributed over the soil flushing units at a rate of 10 gallons per square foot of surface area. There were originally four flushing areas at the site, identified as Flushing Areas A, B, C, and D. The soil flushing units were underlined by a geotextile fabric and covered with cobbles to aid in the diffusion of infiltrating water, and each area was bermed to prevent runoff. The soil in these areas meets Part 201 soil standards based on industrial use, however restrictive covenants are not yet in place.

C. Groundwater Extraction and Treatment

Approximately 35 low volume extraction wells were installed to prevent contamination within the shallow aquifer from migrating outside the current extent of the plume. These wells are screened within the shallow aquifer and each extracts water at 1 gallon per minute (GPM). Effluent from the shallow aquifer extraction system is pumped through a dual carbon canister system to remove the primary volatile organic compound contamination before discharging to a storm sewer system under authority of an NPDES permit.

To address contamination in the deeper bedrock aquifer a fire well was converted into an extraction well in order to prevent further migration of contamination in this area. This well extracts groundwater at a rate of 2,000 gpm with the effluent being directed to an air stripper with final discharge to the storm sewer under the NPDES permit.

System Operation/Operation and Maintenance

The results of the Hydrogeologic Report indicate that releases of constituents of concern have occurred from areas on the property to the soil and ground water. The primary constituent of concern located in all of the source areas is trichloroethylene. In isolated areas, contaminant concentrations were in the thousands of parts per billions.

Table 2 - Annual System Operations/O&M Costs

Dates		Total Cost
From	To	
1/2002	12/2002	\$ 117,000
1/2003	12/2003	\$ 160,000

V. Progress Since the Last Five-Year Review

The last Five-Year Review, completed in 1999, contained several recommendations that are

summarized as follows:

There are three locations where data gaps still exist and additional wells are required; near the intersection of Barnes Street and Clark Street, near monitoring Well B-49s and south of well B-41s. Geoprobe work completed by Cooper Industries in 1999 or 2000 showed that there did not appear to be contamination in shallow aquifer groundwater in the areas of the temporary boring on Linwood Avenue. The investigation did not penetrate the bedrock surface, so there is no evidence of a lack of groundwater contamination in the bedrock aquifer in these areas. There are no bedrock aquifer wells in these areas to confirm hydraulic containment of the contaminant plume. The MDEQ is still concerned with the containment of the shallow aquifer contaminant plume due south of well B-46S. The data from the existing wells is not conclusive. The MDEQ recommends additional well clusters be installed to make certain the plume has been captured. The concentration of contaminants versus time plots for wells down gradient and outside the capture zone (B-46S,B47S) area..

- Change the sampling frequency from three times per year to two times per year.
- Modify the basis for removal of monitoring wells from the network. In order to verify hydraulic containment, an adequate monitoring well network must remain intact and wells located near the perimeter of known groundwater contamination and /or near the extent of groundwater capture must remain in the groundwater sampling network. These wells are the most critical to demonstrating that the contaminant plume has been contained.

In order to address the recommendations in the five-year review and, following additional discussions with the MDEQ, Cooper conducted an additional field investigation in February 2000 and presented its findings in a report dated March 6, 2000, attached. The additional investigation consisted of the advancement of four shallow borings and the collection of groundwater samples from those locations.

In 2000, Cooper received verbal approval from the MDEQ to decrease the groundwater sampling frequency at the site from triannual to semiannual. Under this modified sampling program, Tier 1 wells are sampled twice a year and Tier 2 wells are sampled once a year. Tier 1 wells are considered to be important in monitoring the leading edge of the trichloroethylene (TCE) plume. Tier 2 wells are those where TCE contamination is known to significantly exceed the Maximum Contaminant Level (MCL) for TCE of 5 µg/l. In addition to the decrease in sampling frequency, Cooper received approval to change the Consent Decree groundwater cleanup level for TCE from 1.5 µg/l to the 5 µg/l, which is the current groundwater cleanup criteria under Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451 as amended (Part 201). Changing the soil cleanup level from from 10 µg/lg to the Part 201 industrial cleanup level of 100 µg/kg TCE. These modifications to the Consent Decree were accepted March 2001 by MDEQ.

During the last five years, Cooper has continued to monitor the site in accordance with an approved

Document Review

This Five-Year Review consisted of a review of relevant documents including O&M records, and monitoring data, from the last five years. All cleanup standards in the CD were reviewed and the applicable or relevant and appropriate requirements were reviewed for this Site. Actions taken pursuant to the CD have been conducted in accordance with the requirements of all ARARS, state and federal regulations including CERCLA, the National Contingency Plan, 40 CFR Part 300, and laws relating to occupational safety and health.

Data Review

Groundwater Monitoring

The groundwater recovery system consists of 35 pumping wells in the shallow aquifer zone and one pumping well in the deep (bedrock) zone. The bedrock well is the former fire protection well for the plant. Groundwater recovered from this well has been conveyed to an air stripper on a nearly continuous basis since the early 1980s. The pumping rate for the deep well averages approximately 2,000 gallons per minute (gpm). The deep well has historically contained low levels of TCE (less than 5 – µg/l). Groundwater recovery in the shallow zone has also been conducted since the early 1980s. Initially, seven shallow wells contaminated with TCE in the parts per million (ppm) range were pumped, and groundwater was treated with activated carbon prior to discharge. In late 1990, the shallow groundwater recovery system was expanded to 35 recovery wells, which were ultimately tied into the air stripper used to treat the groundwater from the deep well in 1997. The total flow from the shallow wells is generally 120 to 140 gpm. Cooper received approval to change the Consent Decree groundwater cleanup level for TCE from 1.5µg/l to 5 µg/l which is the current groundwater cleanup criteria under part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Groundwater monitoring has historically been conducted on a triannual basis. In 2000, Cooper received verbal approval from the Michigan Department of Environmental Quality (MDEQ) to decrease the groundwater sampling frequency at the site from triannual to semiannual. Under this modified sampling program, Tier 1 wells (Table 1) will be sampled twice a year and Tier 2 wells (Table 1) will be sampled once a year. Tier 1 wells are considered to be important in monitoring the leading edge of the TCE plume. Tier 2 wells are those where TCE contamination is known to significantly exceed the Maximum Contaminant Level (MCL) for TCE of 5 µg/l.

A majority of the Tier 1 wells have TCE concentrations below the Consent Decree cleanup level of 5.0 µg/l and are therefore considered sentinel wells. Cooper proposes that Tier 1 wells be eliminated from the monitoring program as the TCE plume is remediated. Cooper is also proposing that Tier 2 wells be allowed to be redesignated as Tier 1 as the TCE plume is further retracted. Cooper will formally request these changes in the monitoring program as conditions warrant, based on the results of groundwater monitoring.

Groundwater elevations measured at wells and piezometers during the semi-annual sampling event in April 2004 are summarized in Table 2.

The water-table configuration at the site based on the water levels is presented as Figure 2. Groundwater flow converges toward the area of piezometers P-14 and P16 due to operation of the shallow groundwater recovery system. A well-developed capture zone is evident. Historically the natural flow of groundwater appears to be from the northeast to the southwest.

Figure 4 shows the potentiometric surface for the bedrock aquifer. Groundwater converges toward the fire protection well due to operation of the deep groundwater recovery system. A well-developed capture zone is also evident.

The groundwater samples collected during this sampling event were analyzed for VOCs by Pace Analytical of Export, Pennsylvania, using SW-846 Method 8260. Analytical results are summarized in Tables 3 through 5. These tables include only VOCs that were detected during the sampling event.

Analytical results for wells in the shallow aquifer are summarized in Table 3 and Figure 5. Overall, the current sampling results for the shallow aquifer were in general agreement with those from previous events. TCE was detected in 3 of the 10 samples collected from the shallow aquifer; however, only one well (MW-42S) slightly exceeded the 5 µg/l MDEQ cleanup level. The approximate distribution of TCE in the shallow aquifer is presented on figure 5.

Other VOCs detected in the shallow zone included 1,1,1-trichloroethane (TCA) and tetrachloroethene (PCE). PCE was detected above the MDEQ cleanup level of 5 µg/l in one well (B-42S at 11 µg/l) and was detected slightly above the detection levels in B-109s (1.6 µg/l) and B-110S (1.2 µg/l). The detection of PCE in 42S may be attributed to an offsite source in the vicinity of Brooks Foundry, but further investigation is required to verify the source of the PCE in 42S." A groundwater chemistry map was also prepared for total VOCs in the shallow aquifer (Figure 5). A review of concentrations through time at these wells (Sections 3.4) indicates that concentrations are decreasing or have remained stable. Also presented on this figure is the approximate boundary of the TCE contaminated groundwater above 5 µg/l, based on recent data.

In addition, methylene chloride and toluene were detected in several of the wells at low concentrations. These compounds are not site-related compounds and may be sampling or laboratory artifacts.

Analytical results for wells that monitor the shallow interface zone are summarized in Table 4 and Figure 6. TCE was detected in 1 of the 6 samples collected from the shallow interface aquifer at concentrations that exceed the 5 µg/l cleanup level (160 µg/l at B-45D). Large changes between sampling events at this well have been seen historically and range from 13 µg/l to 250 µg/l.

The distribution of TCE in the shallow interface aquifer, presented in Figure 6, indicated that TCE

concentrations are highest near well B-45D. The general distribution of concentrations is consistent with historic data. Monitoring well B-125D could not be sampled in this event because of an obstruction. The detection of vinyl chloride in H-4D may but further investigation is required to verify the source of the vinyl chloride in H-4D.

Other VOCs detected in the interface zone included acetone, TCA, 1,1-dichloroethane (1,1-DCA), cis-1,2-dichloroethene (cis-1,2-DCE) PCE, and trans-1,2-DCE. These other VOCs were only detected in one well and/ or at concentrations below MDEQ cleanup levels. A groundwater chemistry map was prepared for total VOCs (Figure 6) in the interface aquifer. Based on historic analytical results, the approximate limits of the TCE concentrations exceeding 5 µg/l are also indicated on Figure 6. Low levels of toluene were also detected in some of the interface wells.

Analytical results for the bedrock aquifer are summarized in Table 5. TCE was not detected in any of the six samples collected from the bedrock aquifer at concentrations exceeding the 5 µg/l MDEQ cleanup level.

Other VOCs detected in the deep aquifer included cis-1,2-DCE and vinyl chloride. Cis-1,2-DCE, a degradation product of TCE, was found at a concentration well below the 70 µg/l MDEQ cleanup level in wells B-120D, H-4D and H-6D. The only constituent present in excess of the MDEQ cleanup levels in the bedrock aquifer was vinyl chloride in well H-4D (12 µg/l versus a cleanup level of 2 µg/l). Vinyl chloride has not been detected in the onsite monitoring wells and the elevated detection in H-4D appears to be from an offsite source in the vicinity of Albion Industries.

A groundwater chemistry map (Figure 7) was prepared for total VOCs in the bedrock aquifer. As with the shallow and intermediate maps, the approximate limit of TCE exceeding 5 µg/l is presented, based on historic information. Vinyl chloride is also a degradation product of TCE.

REVIEW OF SELECTED MONITORING WELLS

At the request of MDEQ, trends of TCE concentrations at wells H-6D, B-42S, B-46S, B-47S, and B-110s were reviewed. Those wells are on the downgradient edge of the plume in the shallow aquifer. Time-trend plots are presented in Appendix D.

Well H-6D: TCE concentrations at Well H-6D have shown a downward trend since 1993 with periodic fluctuations. Concentrations have been below the five µg/l MDEQ cleanup levels since January 1998. TCE has not been detected in H-6D since 2002 and has only been detected twice since 1999. P.E. was not detected at H-6D.

Well B-42 S: TCE concentrations at Well B-42S show a general decreasing trend with an upward trend in the last three sampling events. TCE was detected slightly above the 5µg/l MDEQ cleanup level this events. PCE concentrations have remained fairly stable, generally fluctuating between 15 and 20 µg/l; however the latest concentration, just above 10 µg/l, is the lowest detections historically.

Wells B-46 S: TCE concentrations at Well B-24S initially increased through time to a high of 19 µg/l in April 1997 before dropping to below 5 ug/l in July 1998. In November 1998, the concentrations increased to 16 ug/l and show a downward trend to 4.3ug/l during this event, which is below the MDEQ cleanup level. No significant PCE concentrations have been detected in B-46S.

Well 47 S: TCE concentrations at Well B-47 peaked at 22 µg/l in August 1993 and showed an overall decrease through 1997. From 1997 to 2003 a slight upward trend was observed but appears to be decreasing again. Currently, the TCE concentration is below the MDEQ 5 µg/l cleanup level (4.7µg/l). PCE has not been detected at B-47S.

Well B-110 S TCE concentrations at Well B-110 S peaked at 33 µg/l March 1993 and showed a steady decrease to below the MDEQ 5 µg/l cleanup level by July 1997. TCE has only been detected once (91.4µg/l) in the last five sampling events. The PCE concentrations have been generally below the 5 µg/l cleanup criteria since late 1992. Two events have shown concentrations slightly above the criteria since 1992. The last six events show a downward trend and are below the criteria for PCE.

GROUNDWATER RECOVERY SYSTEM PERFORMANCE

In a letter dated February 9, 1999, the MDEQ requested that Cooper provide data on the performance of the groundwater remediation system. Influent from the shallow and deep aquifers to the air stripper is analyzed weekly for TCE and the extraction rates from each aquifer are measured daily. This data for the period from January 2004 (the end of the last reported period) through June 2004 are summarized in Table 7 along with the calculated mass of TCE removed. Graphs showing the weekly and cumulative TCE removed from each aquifer during this period are presented in Appendix E. Between January 2004 and June 2004, approximately 54 pounds of TCE were removed from the shallow aquifer and approximately 2.2 pounds was removed from the bedrock aquifer. No TCE was detected in any of the monthly samples from the deep aquifer; so, for calculation purposes, a TCE concentration of 0.5µg/l (half of the detection limit) was used. Approximately 32,965,000 gallons of water were removed from the shallow aquifer during the period and approximately 527,781,000 gallons have been removed from the deep aquifer overall. The shallow aquifer represents less than 6% of the total amount of water removed, but accounts for over 95% of the TCE that is removed. In July 2004, Cooper prepared and submitted for MDEQ a plan to conduct a test on the deep pumping system to support reduction of the pumping rate.

Soil

MDEQ approved changing the soil TCE cleanup level from 10µg/kg to the Part 201 industrial cleanup level of 100µg/kg TCG.

MDEQ staff reviewed the December 2003 and April 2004 Soil and Groundwater sampling results. It is apparent from the data presented that there are several locations in the area of investigation that showed levels of contaminants exceeding criteria, notably the northeast corner of the building (MB-

11 and 18, MB-1, MB-2, MB-9)(see Figure 1 in Attachments) and loading dock area (MB-11 and MB17).

Site Inspection

Site inspections have been conducted by the MDEQ staff periodically throughout the review period. On August 9, 2004, U. S. EPA MDEQ, and PRPs representatives conducted an on site inspection as part of the Five-Year Review Process. The purpose of the inspection was to assess the protectiveness of the remedy including the common maintenance activities. During the inspection, U.S. EPA, MDEQ, and Cooper representatives inspected the groundwater recovery system room. We walked around the perimeter of the site and inspected the wells, looked at the building and the soil flushing areas.

Interviews

In processing this report, U. S. EPA interviewed the MDEQ and the Cooper representatives to obtain information.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes, the groundwater purge and treatment system continues to operate and function as designed. Plume maps indicate containment, however confirmation of plume containment is needed in the following areas: near the intersection of Barnes Street and Clark Street, near monitoring well B-49S and south of well B-41S. The groundwater is expected to achieve Part 201 cleanup standards according to the timeframe set forth in the CD. Interim institutional controls to prevent exposure to contaminated groundwater until groundwater cleanup standards are achieved need to be addressed.

The northeast corner of the building and the loading dock area exceed Part 201 industrial standards and need to be remediated. MCL 324.20120B(4) requires restrictive covenants if the remedy falls within a limited use category. Those soils that have been cleaned up to industrial standards require a restrictive covenant prohibiting residential use and other 24 hour occupancy uses.

The fence around the Site is intact and in good repair.

Operation and maintenance (O & M): O & M annual costs are consistent with original estimates and there are no indications of any difficulties with the remedy.

Question B: Are the exposure assumptions, toxicity data cleanup levels and remedial action objectives (rads) used at the time of the remedy selection still valid?

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

Yes, the exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (older child trespasser, adult trespasser) and potential future exposures (young and older future child resident, future adult resident and future adult worker) and are still valid. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected and it is expected that all groundwater cleanup levels will be met within approximately the time frame stated in the CD.

Cooper received approval to change the Consent Decree groundwater cleanup level for TCE from 1.5 ug/l to 5 ug/l, which is the current groundwater cleanup criteria under Part 201 of the Natural Resources and Environmental Protection Act, 1994 PA 451 as amended (Part 201), which is an ARAR. MDEQ also approved changing the soil cleanup level from 10 ug/kg to the Part 201 industrial cleanup level of 100 ug/kg TCE. These modifications to the Consent Decree were accepted in March 2001 by MDEQ. MCL 342.20120b(4) requires a restrictive covenant if the remedy falls within a limited use category. Those soils that have been cleaned up to industrial standards require a restrictive covenant prohibiting residential use and other 24 hour occupancy uses.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No ecological targets were identified during the baseline risk assessment and none were identified during the five-year review, and therefore monitoring of ecological targets was not necessary. No weather related events have affected the protectiveness of the remedies. There is no other information that calls into question of the protectiveness of the remedies with the exception of contaminated soils at the footprint of the building. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedies are functioning as intended by the CD. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedies.

VIII. Issues

Table 3: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Remove/Treat contaminated soils at the footprint of the building	N	Y
Capture of contaminated groundwater has not been clearly demonstrated near the intersection of Barnes Street and Clark Street, near monitoring well B-49S and south of well B-41S	N	Y
Monitoring wells(B-42S and B-125D) have elevated concentrations of contaminants	N	Y
Potential residential use of contaminated groundwater	N	Y
Regular maintenance schedule of the extraction/monitoring wells using well cleaning procedures	N	Y
Install additional monitoring wells at the three locations where the data gap exists	N	Y
Soil cleanup levels limit use of Site to Commercial/Industrial	N	Y
Soil contamination exceeds cleanup criteria at the footprint of the building	N	Y

IX. Recommendations and Follow-up Actions**Table 4: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Continue with groundwater pump and treat system and groundwater monitoring	Continue groundwater Monitoring	Cooper	State	2030	N	Y
Capture of contaminated groundwater has not been clearly demonstrated in certain areas	Present written proposed work plan	Cooper	State	2005	N	Y
IC Implementation	Restrictive/ Covenant	Cooper	State	4/2005	N	Y
Potential residential use of contaminated groundwater	submit and implement work plan for residential well inventory; monitoring plan and interim institutional controls	Cooper	State	4/2005	N	Y

Issue	Recommendations and Follow-up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Soil cleanup levels limit use of Site to commercial/Industrial	Submit and implement work plan for implementing restrictive covenant pursuant to Part 201	Cooper	State	4/2005	N	Y
Regular maintenance schedule of the extraction monitoring wells using well cleaning procedures	Submit and implement work plan	Cooper	State	2005	N	Y
Monitoring wells (B-42S and B-125D) have elevated concentrations of contaminants	Submit and implement work plan to investigate source of this contamination	Cooper	State	2007	N	Y
Soil exceeds 201 standards in the northeast corner of the building and loading dock area	Submit and implement work plan to remediate soils in northeast corner of building and loading dock area	Cooper	State	2005	N	Y

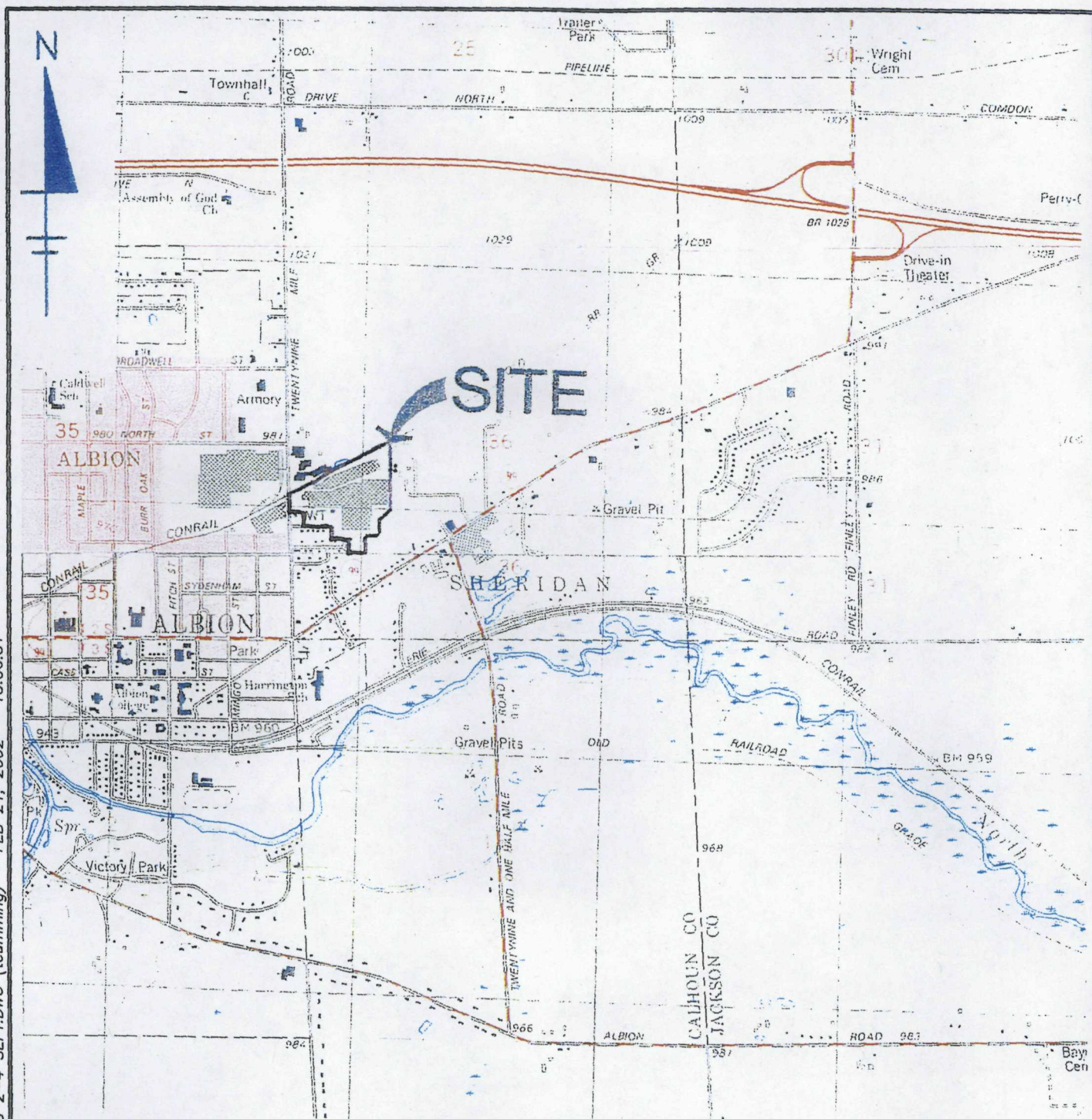
X. Protectiveness Statement(s)

The remedy is considered protective in the short term because there is no evidence that there is current unacceptable exposure with the exception of contaminated soils at the footprint of the building. Soils obtained from location MB18 exceed the soil volatilization to indoor air criteria. Long term protectiveness of the groundwater at the McGraw Edison Corp. Superfund Site will be achieved by continuing the groundwater purge and treatment system until Part 201 groundwater cleanup standards have been achieved throughout the plume as demonstrated by long term groundwater monitoring. Until Part 201 groundwater cleanup standards are achieved, in the interim, a residential well inventory/monitoring plan and interim institutional control plan are necessary to control exposure pathways that could result in unacceptable risks.

In order for the soil remedy to remain protective in the long term, land use restrictions must be implemented via a restrictive covenant (see MCL 342.20120b(4)) that prevents residential and 24 hour occupancy of those areas that have been cleaned up to industrial/commercial cleanup levels.

XI. Next Review

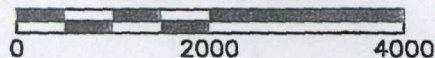
The next five-year review for the Site will be completed five years from this report in October 2009.



REFERENCE:

U.S.G.S. 7.5' TOPOGRAPHIC MAPS, NORTHEAST ALBION
AND SOUTHEAST ALBION, MICHIGAN QUADRANGLES
DATED: 1981; SCALE: 1"=2000'.

SCALE IN FEET



Civil & Environmental Consultants, Inc.

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Cincinnati, OH • Columbus, OH • Indianapolis, IN • Nashville, TN

**SITE LOCATION MAP
FORMER MCGRAW-EDISON FACILITY
ALBION, MICHIGAN**

DWN. BY: SMM

SCALE:

DATE:

PROJECT NO:

CHKD. BY:

1"=2000'

9/5/00

200660

FIGURE 1

G:\PROJECTS\200660\DWG\2002 FIGURES\FIG 2-4 SEPT.DWG (tcumming) - FEB 21, 2002 - 15:06:51

Ms. Gladys Beard

August 26, 2004

ATTACHMENTS

MDEQ's Comments to the December 2003 and April 2004 Soil and Groundwater Sampling Results

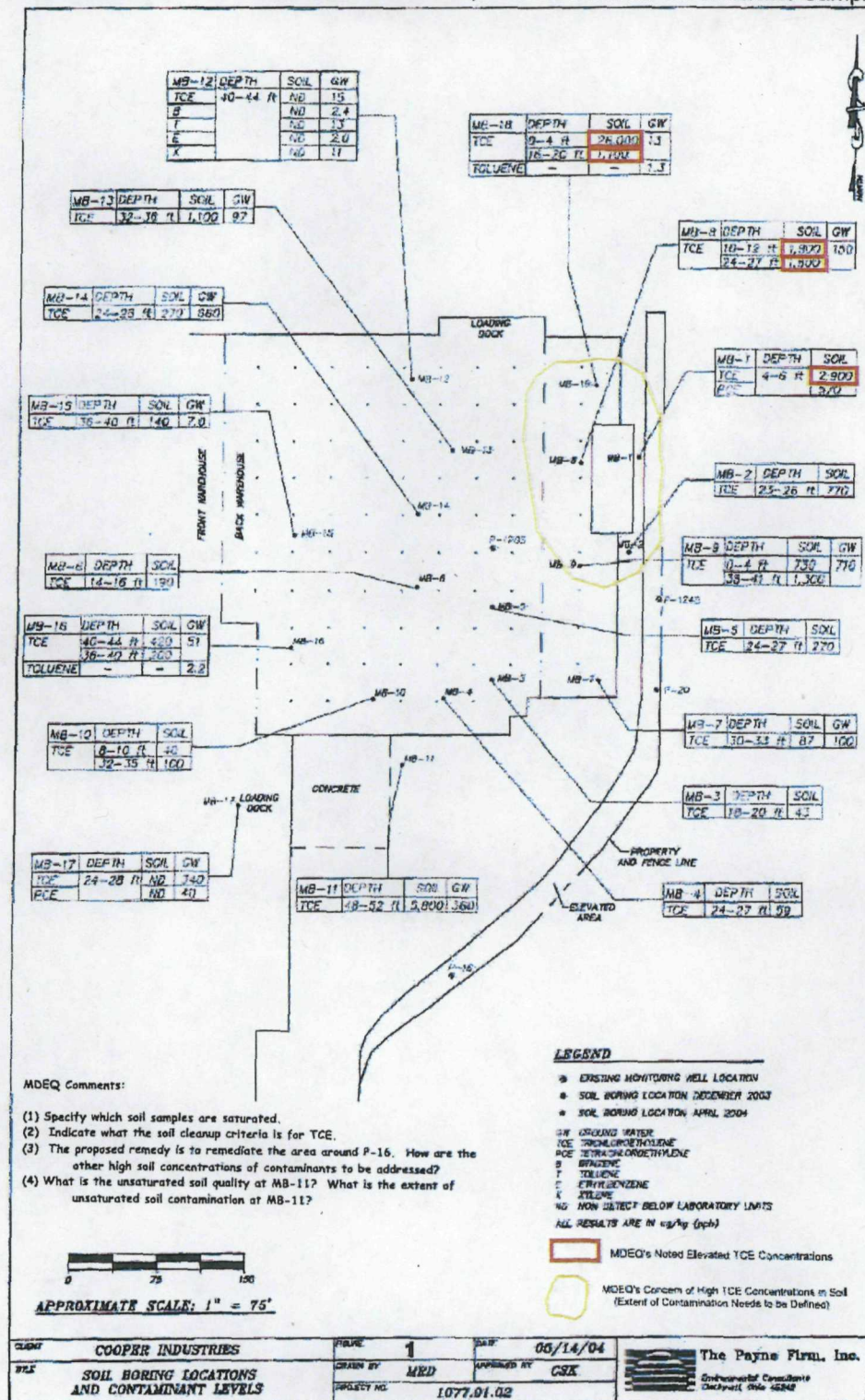
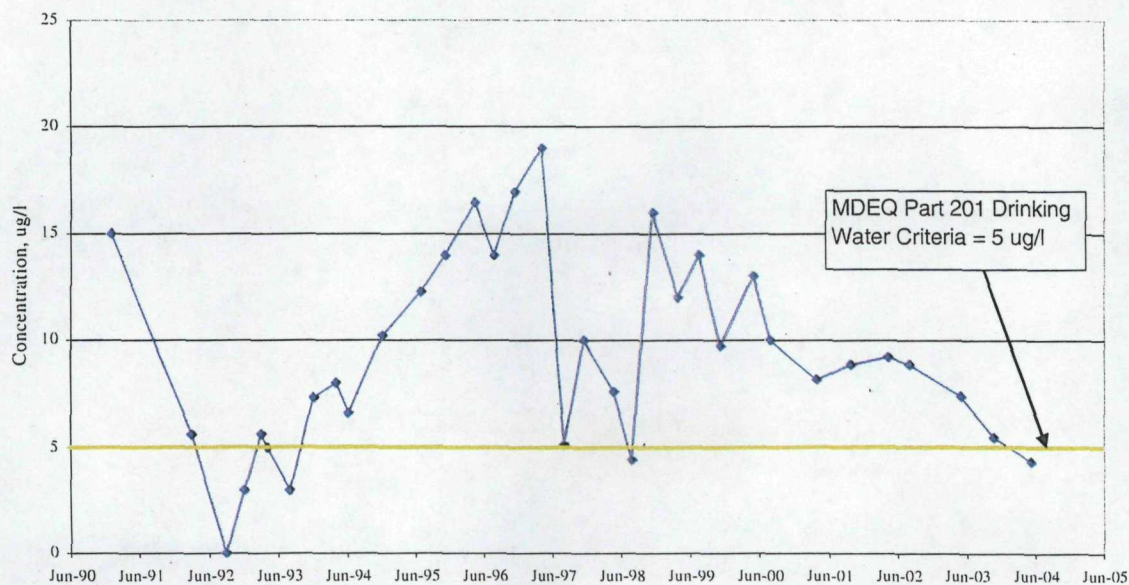


FIGURE 1

TCE Concentration Through Time at Well B-46S



TCE Concentration Through Time at Well B-47S

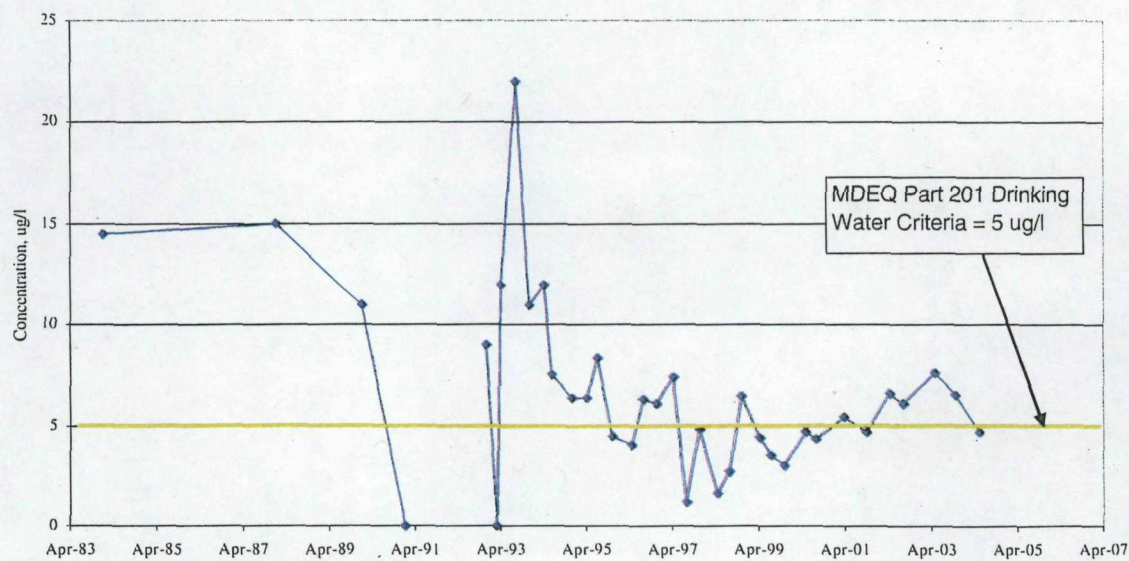
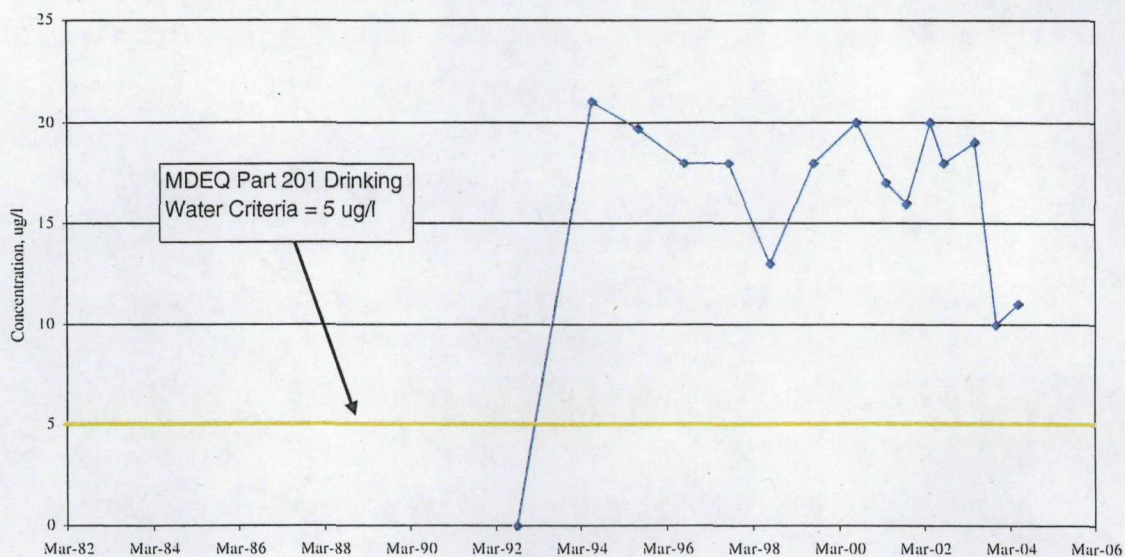


FIGURE 2

PCE Concentration Through Time at Well B-42S



Groundwater Concentrations at Well B-125D
Interface Aquifer

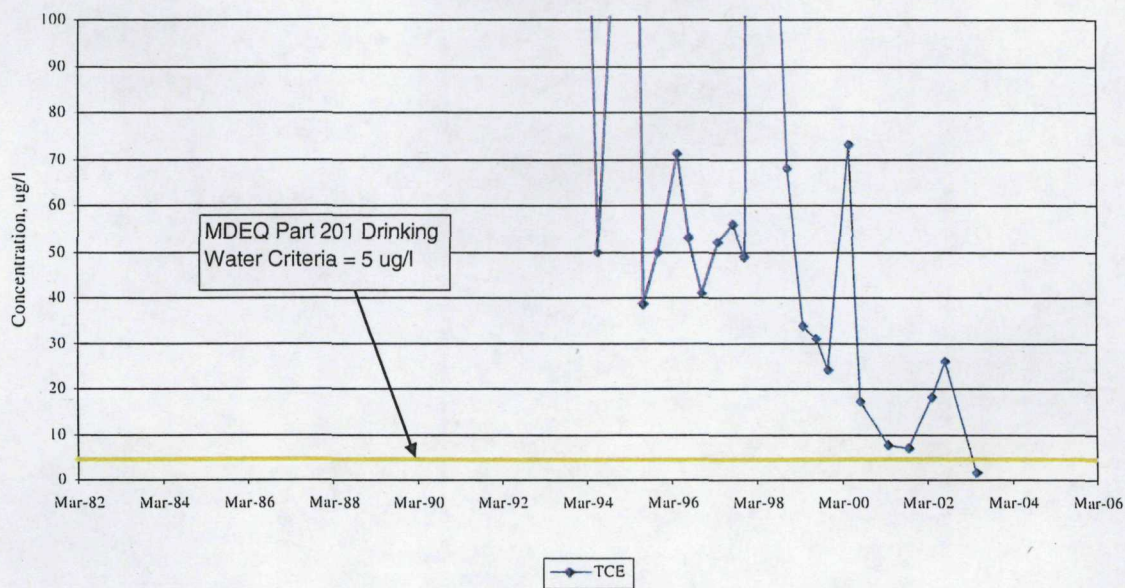


FIGURE 3

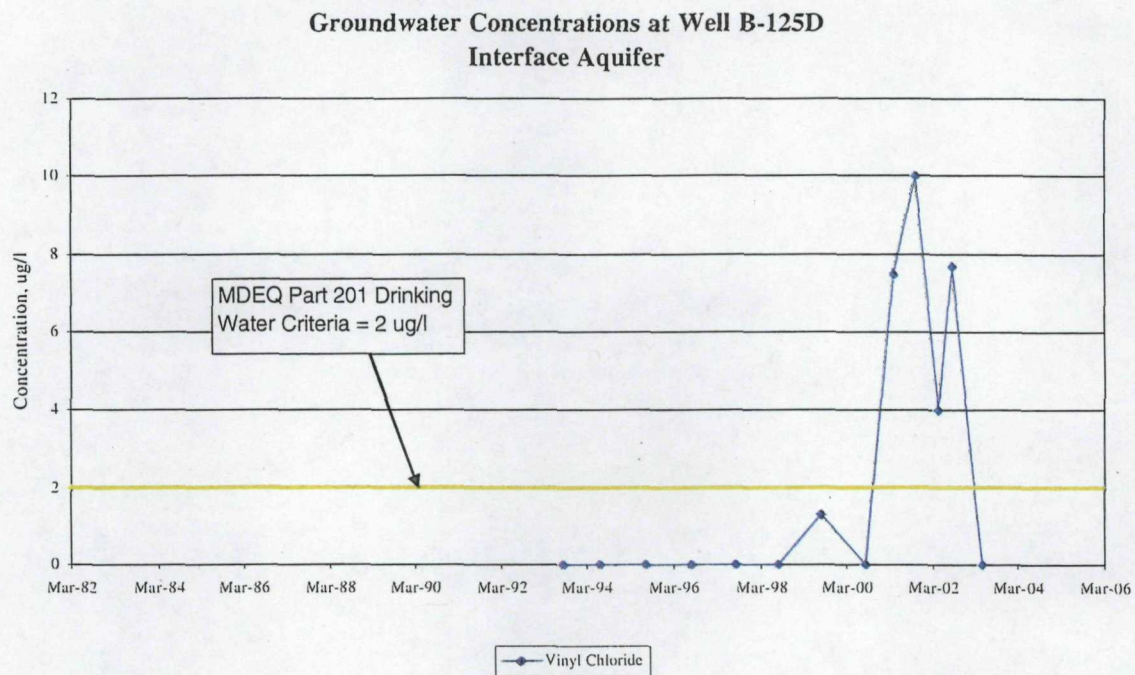


FIGURE 3 (continued)

McGraw-Edison Co. Wetlands Map



Legend

- wetlands
- site_npl

2,000 1,000 0 2,000 Feet



Figure X

Plot created by Andrea Porter U.S. EPA Region 5 on 10/18/2004

McGraw-Edison Co. Sensitive Species Map



Legend



Aquatic/Riparian: Vascular Plants

2,000 1,000 0 2,000 Feet

Figure X



Plot created by Andrea Porter U.S. EPA Region 5 on 10/18/2004

Sensitive Species and Natural Communities Data

Sensitive species and natural communities data are developed from two primary information sources. The majority of the information is from Natural Heritage Data on state- and federally listed threatened or endangered species, acquired under license agreements with state resource agencies. To avoid directly identifying threatened or endangered species by name, sensitive species and natural communities data are grouped into the major categories described in the Rare Species and Natural Communities Groupings Table. This grouping technique was developed as a protective measure, with the participation and approval of resource specialists at state and federal resource agencies within U.S. EPA Region 5. Vascular plants, birds, amphibians and reptiles, mammals, invertebrates, fish, and natural communities were grouped into two habitat subcategories: aquatic/riparian and terrestrial/upland. Species are designated aquatic/riparian if any critical life stage takes place in that setting. This distinction is drawn to aid managers in developing site-specific management approaches.

Rare Species and Natural Communities Groupings Table

Species grouping	Description
Aquatic/riparian zone plants	Ferns, flowering and non-flowering plants associated with aquatic or riparian areas
Upland zone plants	Ferns, flowering and non-flowering plants associated with upland areas
Aquatic/riparian zone birds	Birds associated with aquatic or riparian areas, colonial water bird nesting sites
Terrestrial zone birds	Birds associated with terrestrial areas
Aquatic/riparian zone amphibians	Amphibian/reptile species associated with aquatic or riparian areas
Terrestrial zone amphibians	Amphibian/reptile species and reptiles associated with terrestrial areas
Aquatic/riparian zone mammals	Mammals associated with aquatic or riparian areas
Terrestrial zone mammals	Mammals associated with terrestrial areas
Aquatic/riparian invertebrates	Crayfish, mussels, aquatic insects
Terrestrial invertebrates	Terrestrial insects, spiders
Fish	Fish species
Aquatic natural communities	Communities associated with wetlands or aquatic habitats (e.g., cattail marsh, alder swamp, floodplain forest, mixed emergent marsh)
Terrestrial natural communities	Communities associated with terrestrial habitats (e.g., maple-basswood oak woodland-brushland)

Geographic coordinates for each element in the sensitive species and natural communities data were overlaid on a grid of hexagons to buffer the precise species location. This buffering provides additional protection of sensitive species information. Hexagons represent the approximate locations of species occurrences. Icons for hexagons containing federal or state threatened or endangered species are outlined in red.

Many species are mobile or are inadequately represented by the single points used to derive the sensitive species layer. Therefore, hexagons may not accurately represent the entire area in which the element exists. Moreover, the Natural Heritage Data may not necessarily be an exhaustive database of natural community and rare species data. Species sightings in the state inventory may date back many decades, although this data includes only those occurrences documented during timeframes recommended by individual state natural heritage programs. For these reasons, when sensitive species are shown near a remediation site, managers and planners should consider potential impact on the presence and extent of sensitive species in the general vicinity of specified hexagonal areas.

Wetlands Maps

National Wetland Inventory (NWI) data from the U.S. Fish and Wildlife Service were used to classify and delineate wetland areas. Using the NWI classification system, wetlands in Region 5 were defined as: 1) all Palustrine systems; 2) Lacustrine systems with Littoral subsystems; and 3) Riverine systems with Emergent Wetland class.

Specific definitions are provided here to clarify which characteristics are used to define a 'wetland'. However, on the maps, no distinction is made between categories of wetlands. Areas are designated simply as 'wetlands'.

Palustrine systems include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. It also includes all wetlands that lack vegetation, but meet the following criteria: a) area of less than 20 acres; b) no wave-formed or bedrock shoreline features present; c) water depth in deepest part of the basin is less than 2 meters at low water; and d) salinity due to ocean derived salts is less than 0.5%.

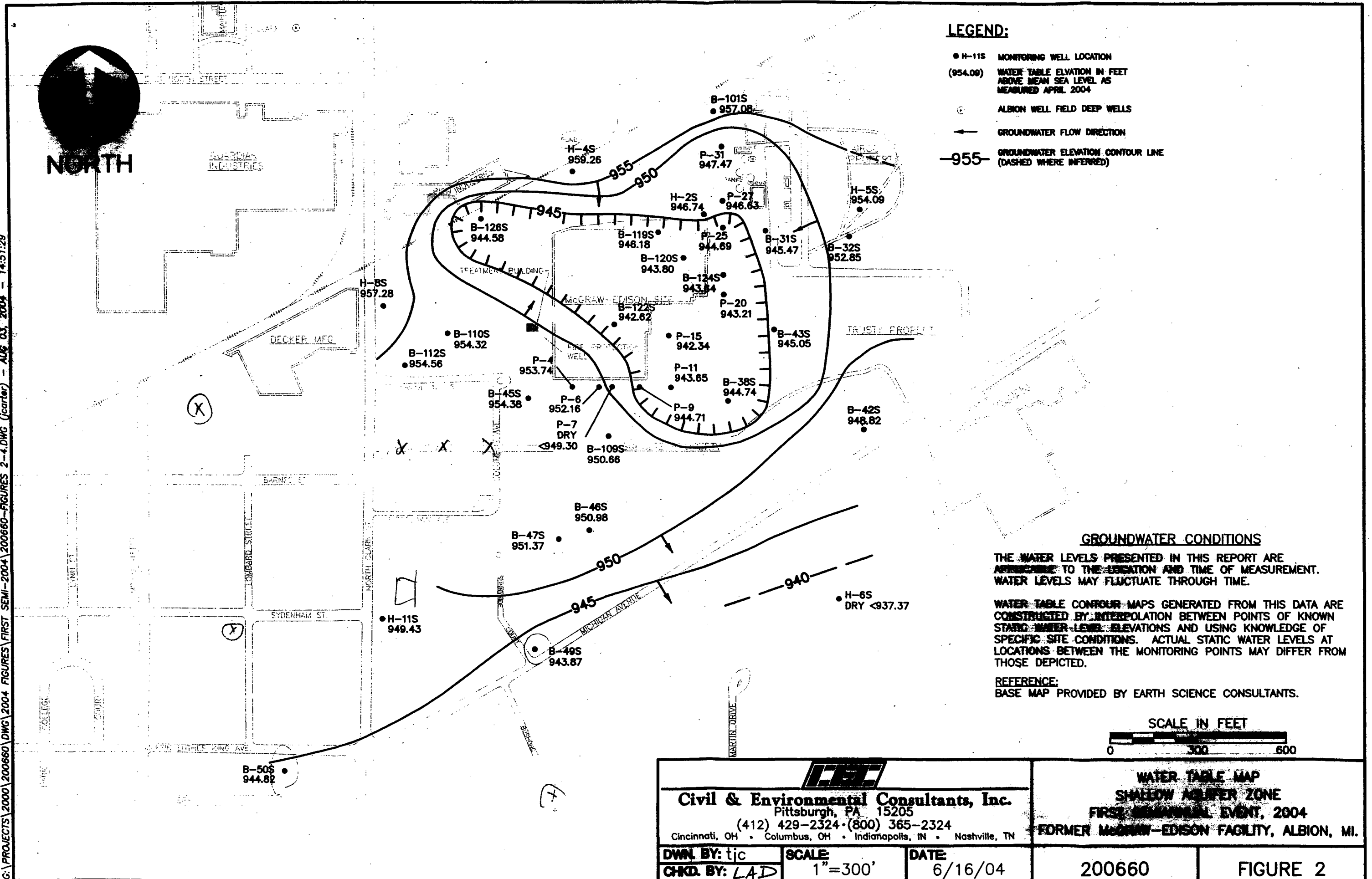
Common names for these wetlands include: marsh, swamp, bog, fen, and prairie. This classification also includes small, shallow, permanent or intermittent water bodies often called ponds.

Lacustrine systems are permanently flooded lakes and reservoirs. The Littoral subsystems within the Lacustrine systems are all of the wetlands associated with lakes and reservoirs. These wetlands extend from the shoreward boundary of the system to a depth of 2 meters below low water level or to the maximum extent of nonpersistent emergents (if these grow at depths greater than 2 meters).

Riverine systems are located within channels. Emergent Wetlands within a Riverine system are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. Common names for these wetlands include: marsh; meadow; fen; prairie pothole; and slough.

Wetland designations may be useful for project management regarding reuse of sites.

G:\PROJECTS\2000\200660\DWG\2004 FIGURES\FIRST SEMI-2004\200660-FIGURES 2-4.DWG (carter) - AUG 03, 2004 - 14:51:29

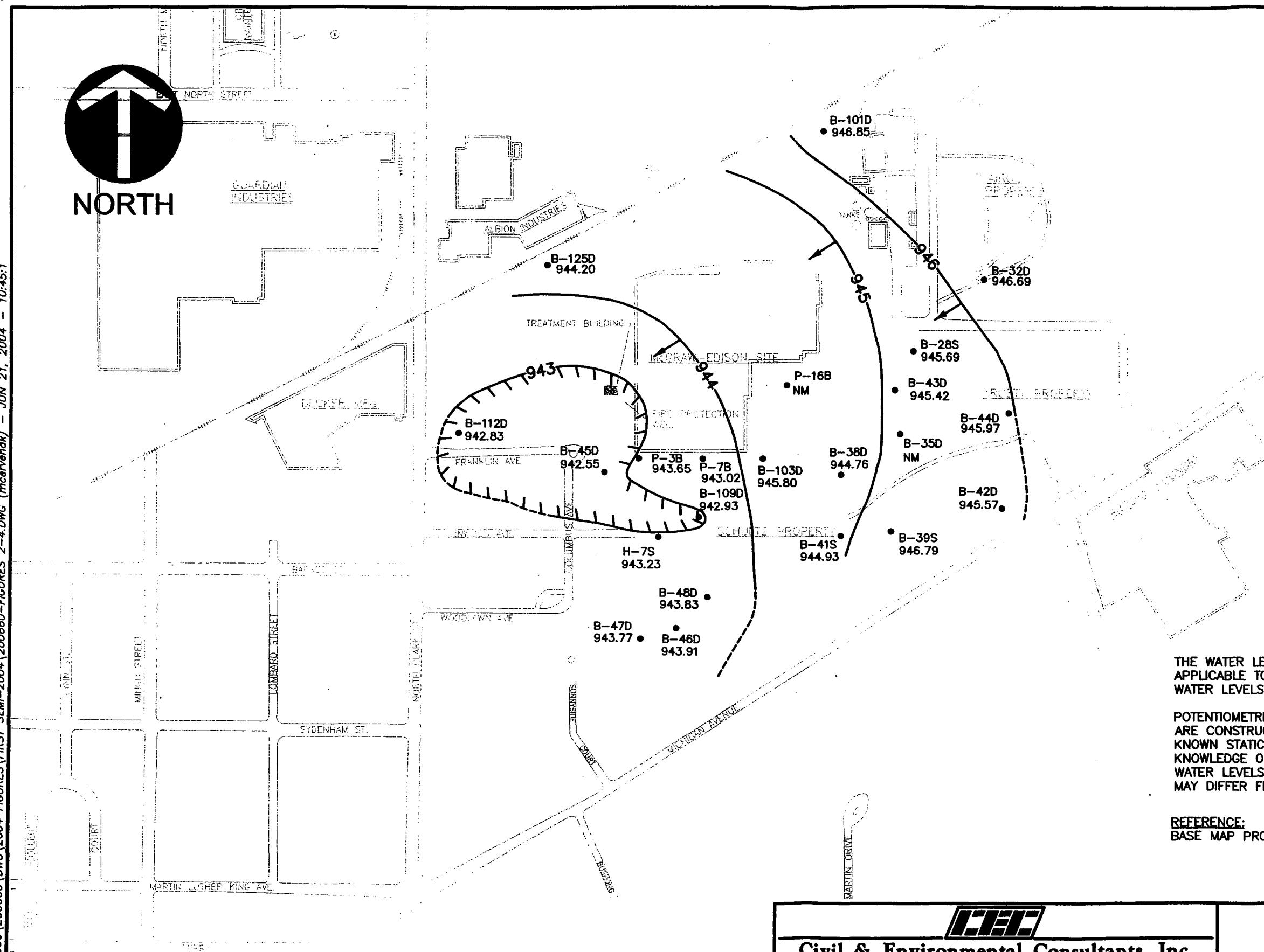


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LEGEND:

- B-101D MONITORING WELL LOCATION
- 944.76 WATER TABLE ELEVATION IN FEET ABOVE MEAN SEA LEVEL AS MEASURED APRIL 2004
- ALBION WELL FIELD DEEP WELLS
- ← GROUNDWATER FLOW DIRECTION
- 944— GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)



GROUNDWATER CONDITIONS

THE WATER LEVELS PRESENTED IN THIS REPORT ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME.

POTENTIOMETRIC CONTOUR MAPS GENERATED FROM THIS DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

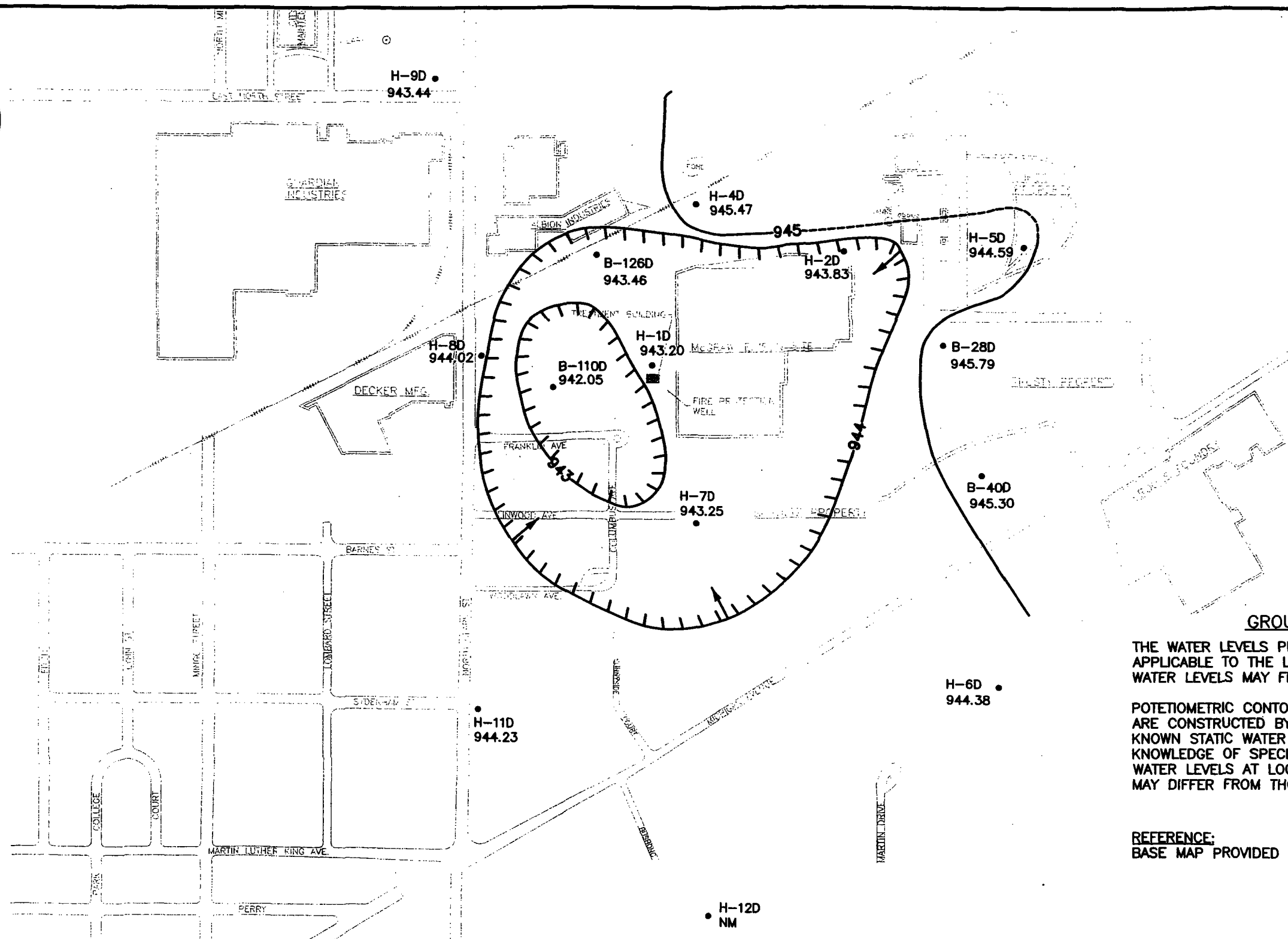
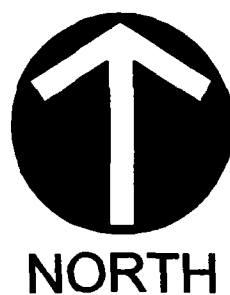
REFERENCE:
BASE MAP PROVIDED BY EARTH SCIENCE CONSULTANTS.

SCALE IN FEET



<p>Civil & Environmental Consultants, Inc. Pittsburgh, PA 15205 (412) 429-2324 • (800) 365-2324 Cincinnati, OH • Columbus, OH • Indianapolis, IN • Nashville, TN</p>			<p>POTENTIOMETRIC SURFACE MAP INTERFACE AQUIFER ZONE FIRST SEMIANNUAL EVENT, 2004 FORMER MCGRAW-EDISON FACILITY, ALBION, MI.</p>	
<p>DWN BY: EMN CHKD BY: LAD</p>	<p>SCALE: 1"=300'</p>	<p>DATE: 6/16/04</p>	<p>PROJECT NO: 200660</p>	<p>FIGURE NO: FIGURE 3</p>

G:\PROJECTS\2000\200660\DWG\2004 FIGURES\FIRST SEMI-2004\200660-FIGURES 2-4.DWG (mcervendk) - JUN 21, 2004 - 10:52:3



LEGEND:

- H-5D MONITORING WELL LOCATION
- 945.79 WATER TABLE ELEVATION IN FEET ABOVE MEAN SEA LEVEL AS MEASURED APRIL 2004
- ALBION WELL FIELD DEEP WELLS
- GROUNDWATER FLOW DIRECTION
- 946— GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

GROUNDWATER CONDITIONS


THE WATER LEVELS PRESENTED IN THIS REPORT ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME.

POTENTIOMETRIC CONTOUR MAPS GENERATED FROM THIS DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

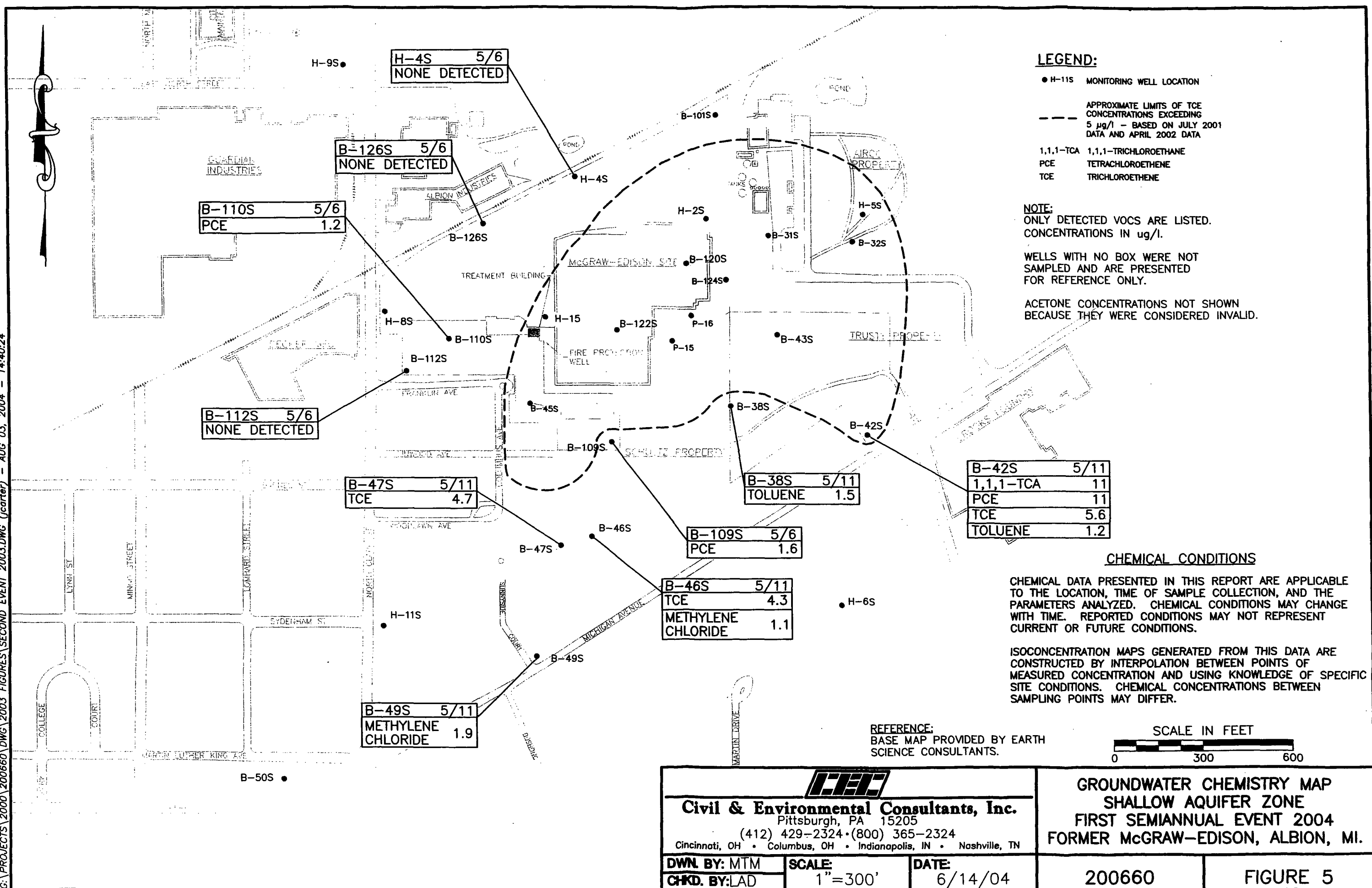
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BASE MAP PROVIDED BY EARTH SCIENCE CONSULTANTS.

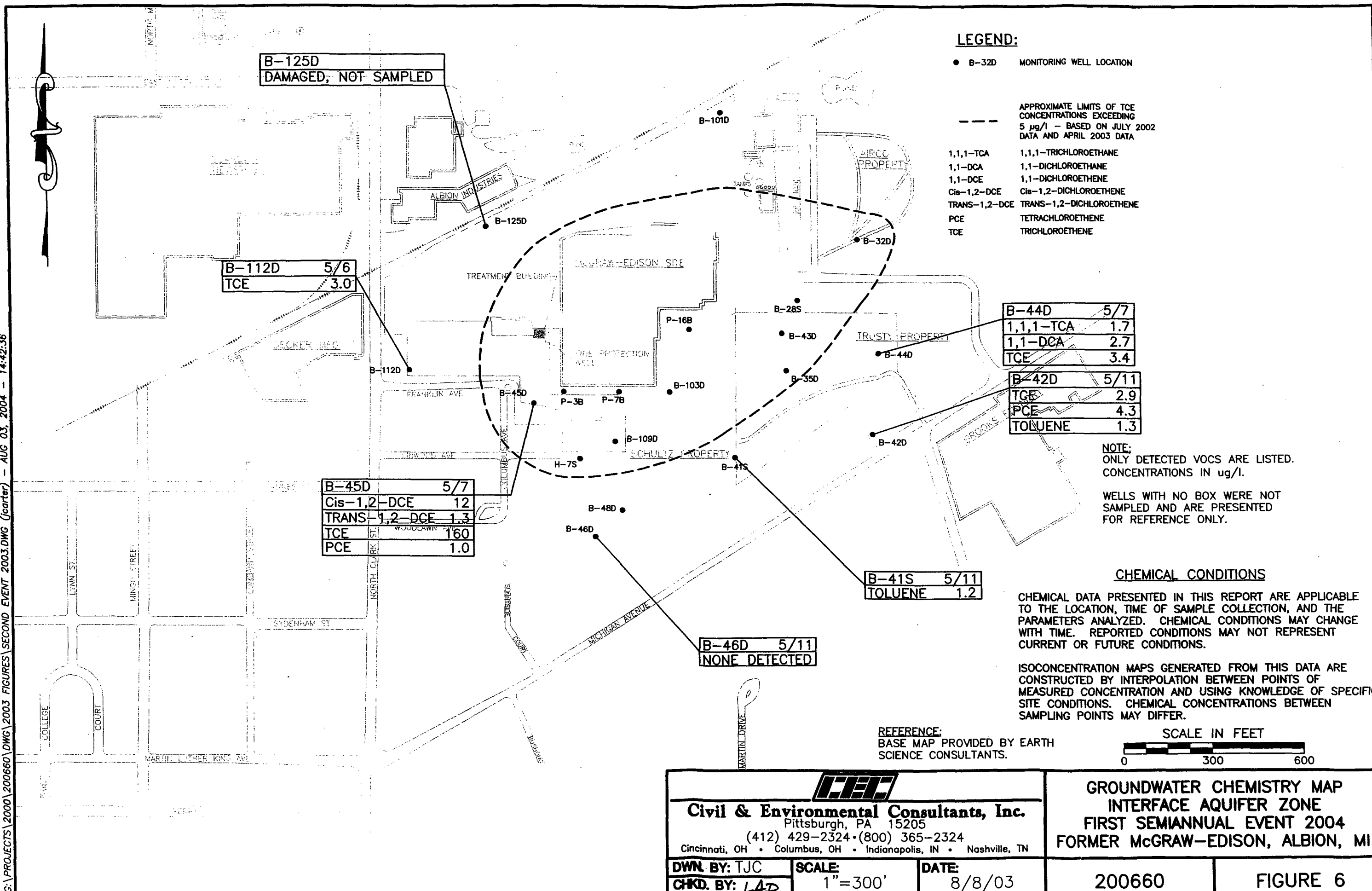


 Civil & Environmental Consultants, Inc. Pittsburgh, PA 15205 (412) 429-2324 • (800) 365-2324 Cincinnati, OH • Columbus, OH • Indianapolis, IN • Nashville, TN		POTENTIOMETRIC SURFACE MAP BEDROCK AQUIFER ZONE FIRST SEMIANNUAL EVENT, 2004 FORMER MCGRAW-EDISON FACILITY, ALBION, MI.	
DWN. BY: EMN	SCALE: 1"=350'	DATE: 6/16/04	PROJECT NO: 200660
CHKD. BY: LAD			FIGURE NO: FIGURE 4

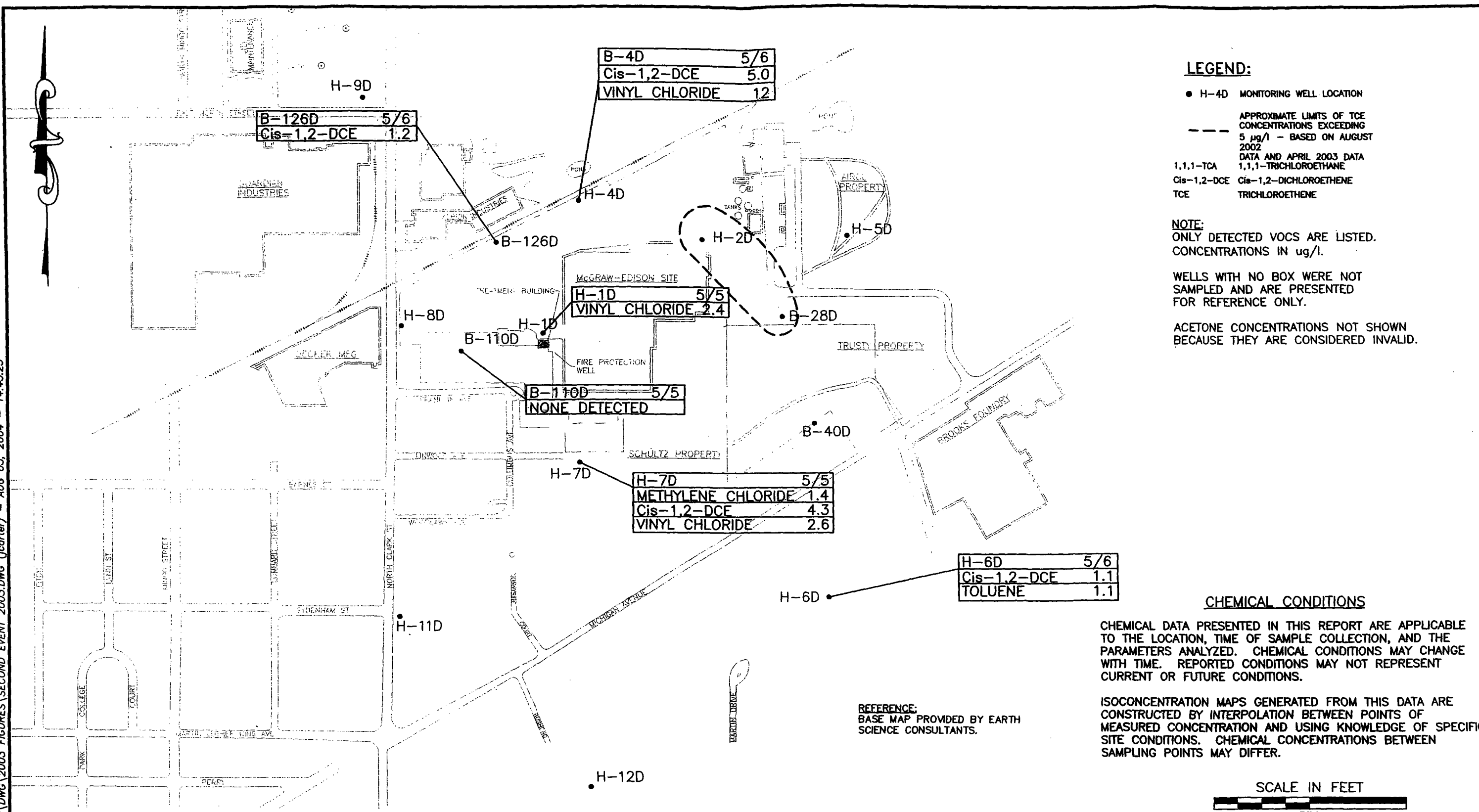
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C&E Civil & Environmental Consultants, Inc. Pittsburgh, PA 15205 (412) 429-2324 • (800) 365-2324 Cincinnati, OH • Columbus, OH • Indianapolis, IN • Nashville, TN			GROUNDWATER CHEMISTRY MAP BEDROCK AQUIFER ZONE FIRST SEMIANNUAL EVENT 2004 FORMER MCGRAW-EDISON, ALBION, MI.	
DWN BY: MTM	SCALE: 1"=350'	DATE: 6/14/04	200660	FIGURE 7
CHKD BY: LAD				

Table 1
Groundwater Sampling Locations
Former McGraw Edison Facility, Albion, Michigan

Monitoring Interval			
	Shallow	Interface	Deep
TIER 1	B-38S	B-41S	B-110D*
	B-42S*	B-42D*	B-126D
	B-46S*	B-44D*	H-1D
	B-47S*	B-45D*	H-4D
	B-49S	B-46D	H-6D
	B-109S	B-112D	H-7D
	B-110S	B-125D*	
	B-112S		
	B-126S		
	H-4S*		
TIER 2	B-31S*	B-28S*	B-28D*
	B-32S*	B-32D*	B-40D*
	B-43S*	B-35D*	H-2D*
	B-45S*	B-43D*	H-5D
	B-50S	B-48D	H-8D (1)
	B-101S*	B-101D	H-9D
	B-120S*	B-103D	H-11D (1)
	B-122S*	B-109D	H-12D (1)
	B-124S*	H-7S*	
	H-1S	P-7B*	
	H-2S	P-16B*	
	H-5S*		
	H-6S (1)		
	H-8S (1)		
	H-11S (1)*		
	P-16*		

Notes:

1 - Sampled on even years. Next sample date in Second Semiannual event 2004.

* Purge water containerized

Table 2
Summary of Groundwater Elevations
Semi-Annual Sampling Event 2004 (April 2004)
Former McGraw Edison Facility, Albion, Michigan

Monitoring Well/ Piezometer	Well Designation	Aquifer Designation	Well Sampled	Reference Elevation (ft MSL)	Total Well Depth (ft)	Water Level (ft)	Groundwater Elevation (ft MSL)
H-1S	Tier 2	WT	YES	984.04	37.87	DRY	#VALUE!
H-1D	Tier 1	B	YES	983.71	197.72	40.51	943.20
H-2S	Tier 2	WT	YES	984.99	41.87	38.25	946.74
H-2D	Tier 2	B	YES	982.71	101.67	38.88	943.83
H-4S	Tier 1	WT	YES	982.46	25.53	23.20	959.26
H-4D	Tier 1	B	YES	981.22	81.72	35.75	945.47
H-5S	Tier 2	WT	YES	988.60	38.94	34.51	954.09
H-5D	Tier 2	B	YES	987.69	196.48	43.10	944.59
H-6S	Tier 2	WT	YES	968.34	30.97	DRY	#VALUE!
H-6D	Tier 1	B	YES	964.76	60.00	20.38	944.38
H-7S	Tier 2	SI	YES	979.13	56.99	35.90	943.23
H-7D	Tier 1	B	YES	979.72	181.83	36.47	943.25
H-8S	Tier 2	WT	YES	980.49	30.29	23.21	957.28
H-8D	Tier 2	B	YES	980.19	121.66	36.17	944.02
H-9D	Tier 2	B	YES	985.55	101.85	42.11	943.44
H-11S	Tier 2	WT	YES	978.46	31.12	29.03	949.43
H-11D	Tier 2	B	YES	977.97	281.46	33.74	944.23
H-12D	Tier 2	B	YES	953.85	160.00	NM	#VALUE!
B-28S	Tier 2	SI	YES	991.84	52.60	46.15	945.69
B-28D	Tier 2	B	YES	991.63	86.82	45.84	945.79
B-31S	Tier 2	WT	YES	990.24	50.14	44.77	945.47
B-32S	Tier 2	WT	YES	990.47	41.28	37.62	952.85
B-32D	Tier 2	SI	YES	990.47	52.39	43.78	946.69
B-35D	Tier 2	BI	YES	986.69	89.10	NM	#VALUE!
B-38S	Tier 1	WT	YES	989.25	50.21	44.51	944.74
B-38D		SI	NO	989.07	59.55	44.31	944.76
B-39S		SI	NO	989.43	52.62	42.64	946.79
B-40D	Tier 2	B	YES	990.08	90.45	44.78	945.30
B-41S	Tier 1	SI	YES	989.06	51.26	44.13	944.93
B-42S	Tier 1	WT	YES	984.57	46.15	35.75	948.82
B-42D	Tier 1	SI	YES	984.61	65.60	39.04	945.57
B-43S	Tier 2	WT	YES	986.61	50.00	41.56	945.05
B-43D	Tier 2	BI	YES	986.76	90.23	41.34	945.42
B-44D	Tier 1	BI	YES	988.07	89.95	42.10	945.97
B-45S	Tier 2	WT	YES	982.80	35.01	28.42	954.38
B-45D	Tier 1	SI	YES	981.70	99.83	39.15	942.55
B-46S	Tier 1	WT	YES	982.81	35.82	31.83	950.98
B-46D	Tier 1	BI	YES	982.83	69.28	38.92	943.91
B-47S	Tier 1	WT	YES	984.04	36.76	32.67	951.37
B-47D		BI	NO	983.73	71.65	39.96	943.77
B-48D	Tier 2	BI	YES	982.08	67.02	38.25	943.83

Table 2
Summary of Groundwater Elevations
Semi-Annual Sampling Event 2004 (April 2004)
Former McGraw Edison Facility, Albion, Michigan

Monitoring Well/ Piezometer	Well Designation	Aquifer Designation	Well Sampled	Reference Elevation (ft MSL)	Total Well Depth (ft)	Water Level (ft)	Groundwater Elevation (ft MSL)
B-49S	Tier 1	WT	YES	979.49	40.20	35.62	943.87
B-50S	Tier 2	WT	YES	981.18	40.30	36.36	944.82
B-101S	Tier 2	WT	YES	983.51	32.00	26.43	957.08
B-101D	Tier 2	SI	YES	983.50	66.10	36.65	946.85
B-103D	Tier 2	BI	YES	986.85	66.50	41.05	945.80
B-109S	Tier 1	WT	YES	979.94	34.29	29.28	950.66
B-109D	Tier 2	BI	YES	979.69	64.64	36.76	942.93
B-110S	Tier 1	WT	YES	983.84	33.10	29.52	954.32
B-110D	Tier 1	B	YES	983.70	108.00	41.65	942.05
B-112S	Tier 1	WT	YES	980.52	27.14	25.96	954.56
B-112D	Tier 1	BI	YES	980.81	65.76	37.98	942.83
B-120S	Tier 2	WT	YES	981.80	41.20	38.00	943.80
B-122S	Tier 2	WT	YES	980.66	39.15	38.04	942.62
B-124S	Tier 2	WT	YES	988.41	47.37	44.77	943.64
B-125D	Tier 1	BI	YES	983.12	102.25	38.92	944.20
B-126S	Tier 1	WT	YES	983.29	44.00	38.71	944.58
B-126D	Tier 1	B	YES	982.58	147.60	39.12	943.46
P-1		WT	NO	983.83	34.50	29.90	953.93
P-2		WT	NO	983.86	34.70	NM	#VALUE!
P-3B		SI	NO	984.30	56.29	40.65	943.65
P-3		WT	NO	984.27	34.90	30.25	954.02
P-4		WT	NO	984.18	34.21	30.44	953.74
P-5		WT	NO	984.22	35.08	31.66	952.56
P-6		WT	NO	984.26	35.11	32.10	952.16
P-7B	Tier 2	SI	YES	984.75	56.63	41.73	943.02
P-7		WT	NO	984.27	34.97	DRY	#VALUE!
P-8		WT	NO	984.43	34.41	DRY	<950.02
P-9		WT	NO	984.53	42.38	39.82	944.71
P-10		WT	NO	984.99	43.07	41.40	943.59
P-11		WT	NO	987.77	51.62	44.12	943.65
P-12		WT	NO	987.72	46.26	44.60	943.12
P-13		WT	NO	987.42	48.77	44.66	NM
P-14		WT	NO	987.43	47.63	44.85	942.58
P-15		WT	NO	987.15	48.02	44.81	942.34
P-16	Tier 2	WT	YES	987.94	49.35	45.79	942.15
P-16B	Tier 2	SI	YES	988.67	67.13	NM	#VALUE!
P-17		WT	NO	988.68	48.49	46.12	942.56
P-18		WT	NO	988.79	50.50	45.84	942.95
P-19B		SI	NO	987.31	64.20	44.31	943.00
P-19		WT	NO	987.57	49.55	44.41	NM
P-20		WT	NO	987.74	49.55	44.53	943.21

Table 2
Summary of Groundwater Elevations
Semi-Annual Sampling Event 2004 (April 2004)
Former McGraw Edison Facility, Albion, Michigan

Monitoring Well/ Piezometer	Well Designation	Aquifer Designation	Well Sampled	Reference Elevation (ft MSL)	Total Well Depth (ft)	Water Level (ft)	Groundwater Elevation (ft MSL)
P-21B		WT	NO	988.62	52.99	45.24	943.38
P-21		WT	NO	988.74	48.18	45.36	943.38
P-22		WT	NO	990.10	49.71	46.94	943.16
P-23		WT	NO	990.11	48.51	46.31	943.80
P-24B		WT	NO	991.18	52.74	46.90	944.28
P-24		WT	NO	990.46	49.72	46.21	944.25
P-25		WT	NO	991.14	49.42	46.45	944.69
P-26		WT	NO	990.49	47.97	44.78	945.71
P-27B		WT	NO	990.12	4.14	43.53	946.59
P-27		WT	NO	990.77	47.14	44.14	946.63
P-28		WT	NO	989.41	46.26	42.11	947.30
P-29		WT	NO	989.04	37.08	DRY	<951.96
P-30B		WT	NO	988.32	44.01	39.21	949.11
P-30		WT	NO	988.63	47.64	39.53	949.10
P-31		WT	NO	987.83	46.66	40.36	947.47
P-32		WT	NO	985.96	34.39	DRY	#VALUE!
P-33B		WT	NO	984.97	37.00	28.10	956.87
P-33		WT	NO	984.96	33.09	27.77	957.19
P-34		WT	NO	983.96	34.01	27.02	956.94

Notes:

NM indicates water level not measured

WT = well/piezometer completed at or near water table

SI = well/piezometer completed in the shallow aquifer interface zone

B = well/piezometer completed in bedrock

BI = well/piezometer completed at interface of bedrock and shallow aquifer

ft MSL = feet above Mean Sea Level

Table 3
Summary Of Analytical Results
First Semiannual Sampling Event 2004
Shallow Aquifer Monitoring Wells
Former McGraw Edison Facility, Albion, Michigan

Monitoring Point: Date Sampled:	B-38S 5/11/2004	B-42S 5/11/2004	B-46S 5/11/2004	B-47S 5/11/2004	B-49S 5/5/2004	B-109S 5/6/2004	B-110S 5/6/2004	B-112S 5/6/2004	B-126S 5/6/2004	H-4S 5/6/2004	Cleanup Level (1)
Volatile Organic Compounds (ug/l)											
Methylene Chloride	<1	<1	1.1	<1	1.9	<1	<1	<1	<1	<1	
Tetrachloroethene	<1	11	<1	<1	<1	1.6	1.2	<1	<1	<1	5
Toluene	1.5	1.2	<1	<1	<1	<1	<1	<1	<1	<1	
1,1,1-Trichloroethane	<1	11	<1	<1	<1	<1	<1	<1	<1	<1	200
Trichloroethene	<1	5.6	4.3	4.7	<1	<1	<1	<1	<1	<1	5

Notes:

(1) MERA Cleanup Criteria for residential drinking water.

Only parameters detected above practical quantification limit are shown.

Table 4
Summary Of Analytical Results
First Semiannual Sampling Event 2004
Interface Aquifer Monitoring Wells
Former McGraw Edison Facility, Albion, Michigan

Monitoring Point: Date Sampled:	B-41S 5/11/2004	B-42D 5/11/2004	B-44D 5/7/2004	B-45D 5/7/2004	B-46D 5/11/2004	B-112D 5/6/2004	B-125D --	Cleanup Level (1)
Volatile Organic Compounds (ug/l)								
1,1-Dichloroethane	<1	<1	2.7	<1	<1	<1	Not	880
cis-1,2-Dichloroethene	<1	<1	<1	12	<1	<1	Sampled	70
Toluene	1.2	1.3	<1	<1	<1	<1		
trans-1,2-Dichloroethene	<1	<1	<1	1.3	<1	<1	Well	100
Tetrachloroethene	<1	4.3	<1	1	<1	<1	Damaged	5
1,1,1-Trichloroethane	<1	<1	1.7	<1	<1	<1		200
Trichloroethene	<1	2.9	3.4	160	<1	3		5

Notes:

- (1) MERA Cleanup Criteria for residential drinking water.
Only parameters detected above practical quantification limit are shown.

Table 5
Summary Of Analytical Results
First Semiannual Sampling Event 2004
Bedrock Aquifer Monitoring Wells
 Former McGraw Edison Facility, Albion, Michigan

Monitoring Point: Date Sampled:	B-110D 5/5/2004	B-126D 5/6/2004	H-1D 5/5/2004	H-4D 5/6/2004	H-6D 5/6/2004	H-7D 5/5/2004	Cleanup Level (1)
Volatile Organic Compounds (ug/l)							
cis-1,2-Dichloroethene	<1	1.2	<1	5	1.1	4.3	70
Methylene Chloride	<1	<1	<1	<1	<1	1.4	
Toluene	<1	<1	<1	<1	1.1	<1	
Trichloroethene	<1	<1	<1	<1	<1	<1	5
Vinyl chloride	<1	<1	2.4	12	<1	2.6	2

Notes:

(1) MERA Cleanup Criteria for residential drinking water.

Only parameters detected above practical quantification limit are shown.

Table 6
Summary Of Analytical Results
First Semiannual Sampling Event 2004
Quality Control Samples
Former McGraw Edison Facility, Albion, Michigan

Sample Identification:	Duplicates				Equipment Blanks			Trip Blanks
	H-49S	Dup 1 (H-49S)	B-112S	Dup2 (B-112S)	Equipment Blank 1	Equipment Blank 2	Equipment Blank 3	Trip Blank
Volatile Organic Compounds (ug/l)								
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	1.9	<1	<1	<1	1.7	1	1.5	2.5
Toluene	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2

Notes:

Only parameters detected above quantification limits in all samples are shown.

Table 7
Summary of Mass Removal from the Aquifers
First Semiannual Sampling Event 2004
Former McGraw Edison Facility - Albion, Michigan

Month	Sample Date	Weekly Volume (gal)	TCE Concentration (ug/l)	Weekly TCE Removed (lbs)	Cumulative TCE Removed (lbs) (2)
Shallow Aquifer					
January 2004	1/5/2004	5,969,000	160	7.97076384	395.64
#####	2/2/2004	5,471,000	230	10.50202218	406.14
March 2004	3/1/2004	5,854,000	190	9.28292196	415.42
April 2004	4/12/2004	5,516,000	200	9.2073072	424.63
May 2004	5/4/2004	5,563,000	180	8.35718364	432.99
June 2004	6/1/2004	5,439,000	170	7.71696198	440.71
Period Totals		33,812,000		53.04	
Deep Aquifer					
January 2004	1/5/2004	90,052,000	0.5	0.375786996	37.95
#####	2/2/2004	84,461,000	0.5	0.352455753	38.30
March 2004	3/1/2004	87,390,000	0.5	0.36467847	38.67
April 2004	4/12/2004	83,591,000	0.5	0.348825243	39.02
May 2004	5/4/2004	89,970,000	0.5	0.37544481	39.39
June 2004	6/1/2004	87,033,000	0.5	0.363188709	39.75
Period Totals		522,497,000		2.18 (1)	

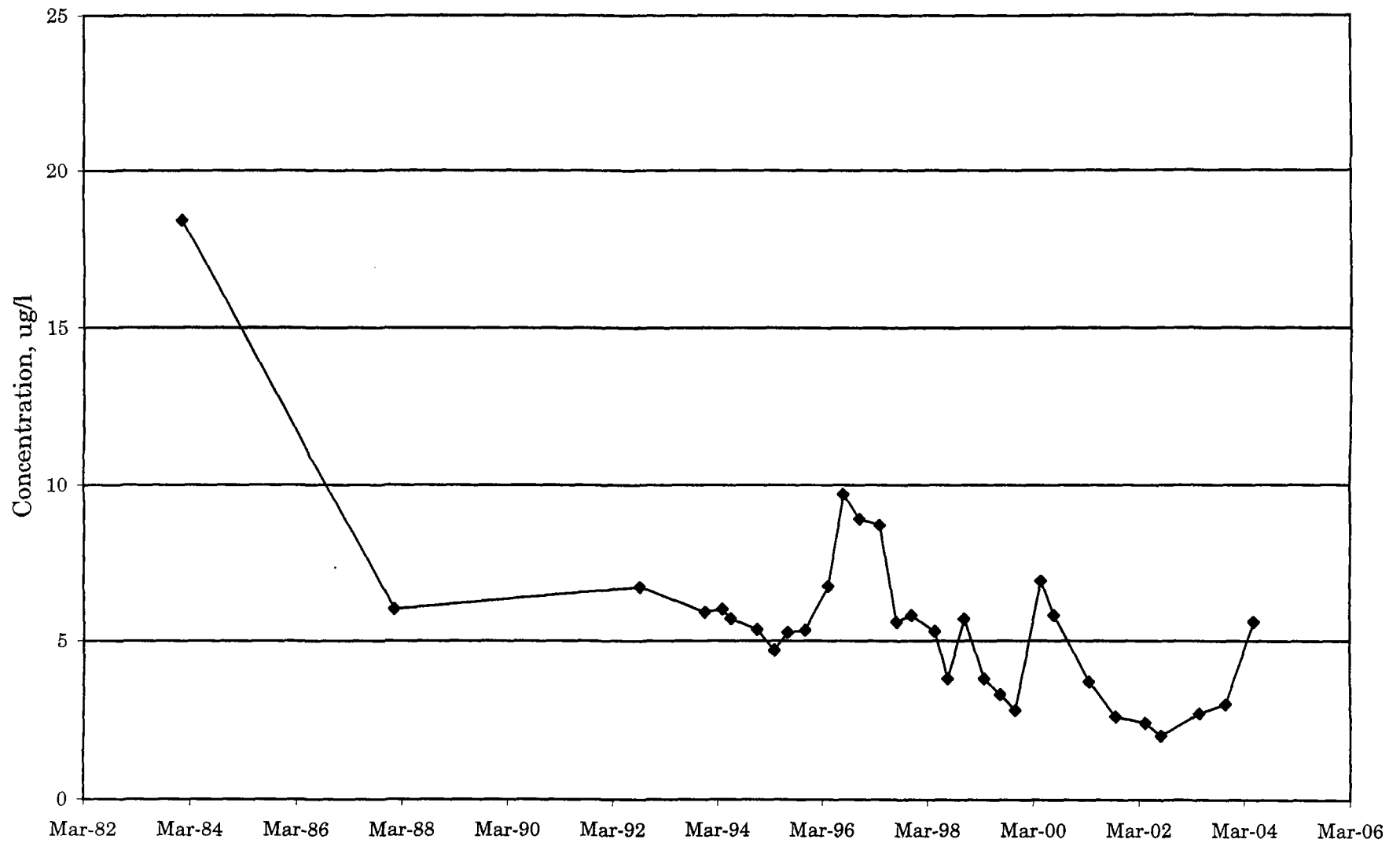
Notes:

- 1 - No TCE was detected in from the water extracted from the Deep Aquifer. Removal volume based on assumed concentration of 1/2 of the detection limit.
- 2 - Continued from previous reports.

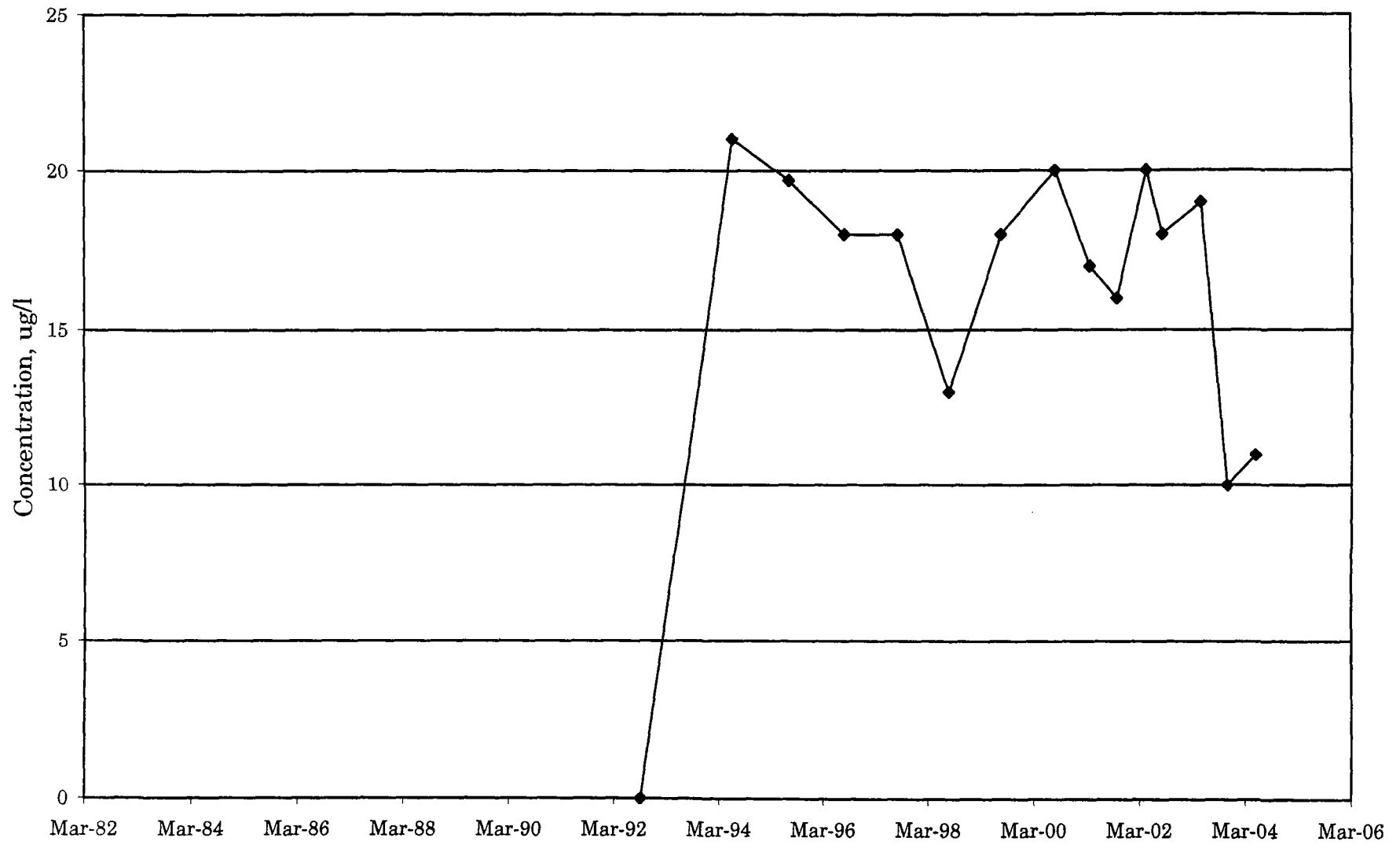
APPENDIX D

TIME-TREND PLOTS

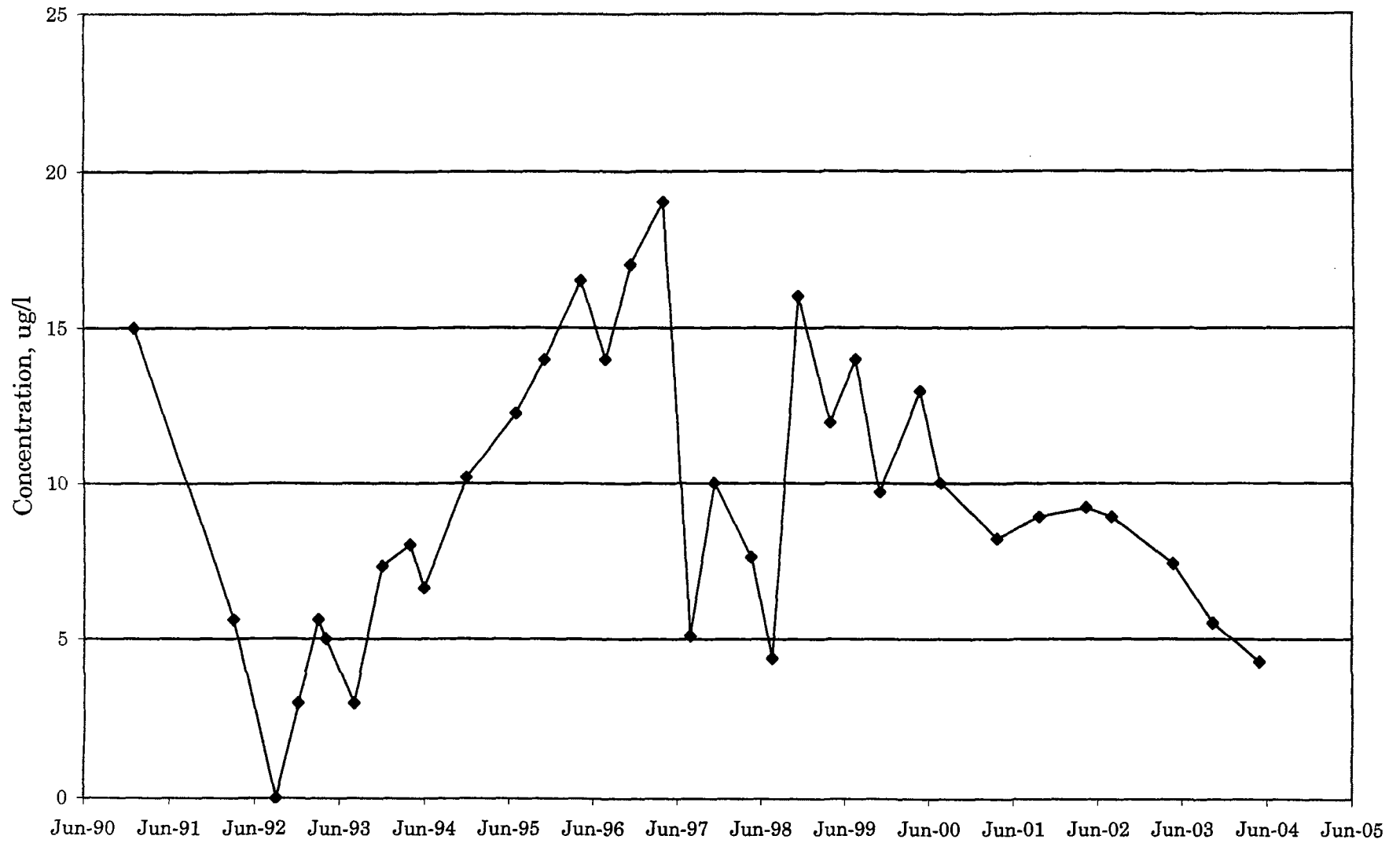
TCE Concentration Through Time at Well B-42S



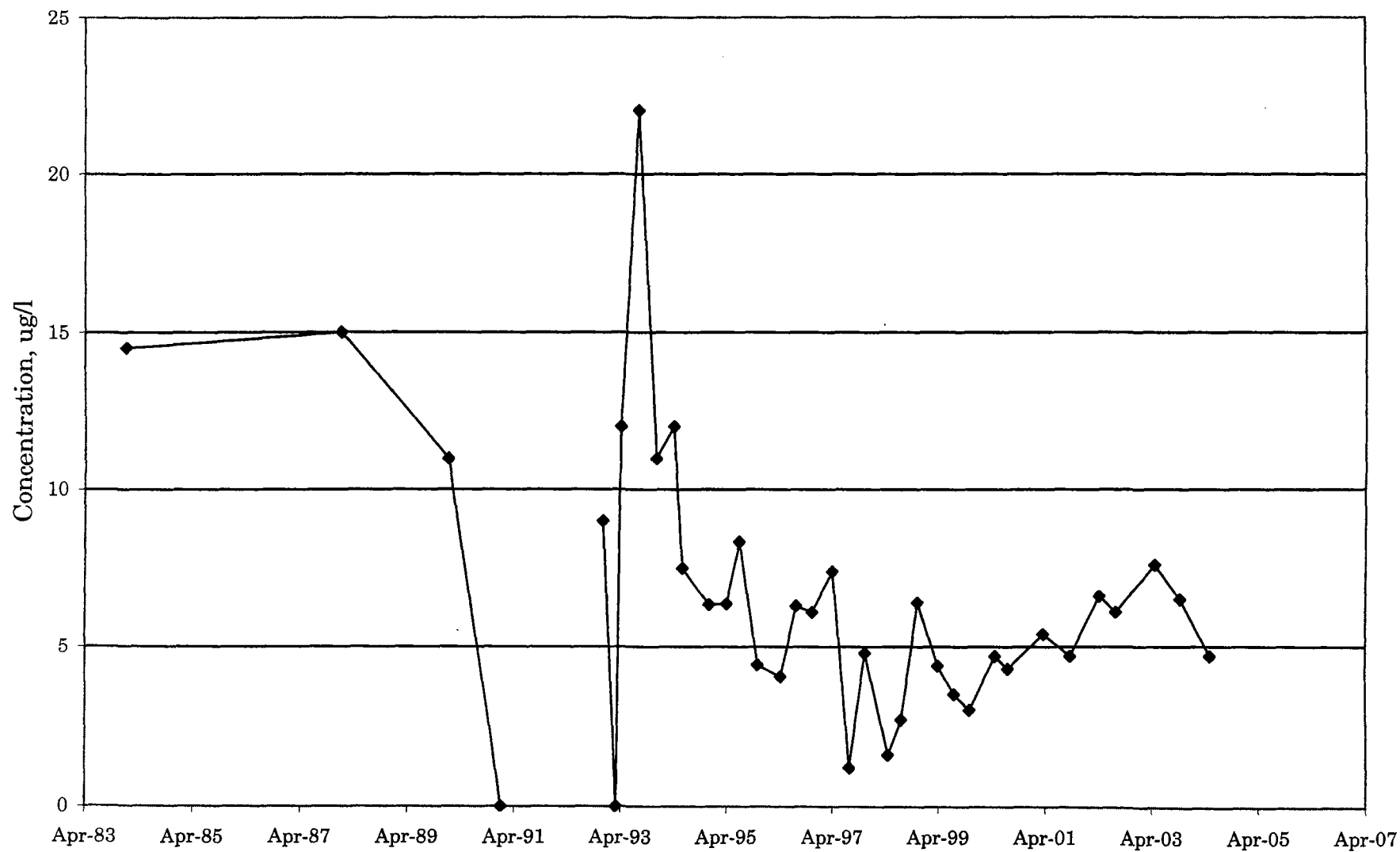
PCE Concentration Through Time at Well B-42S



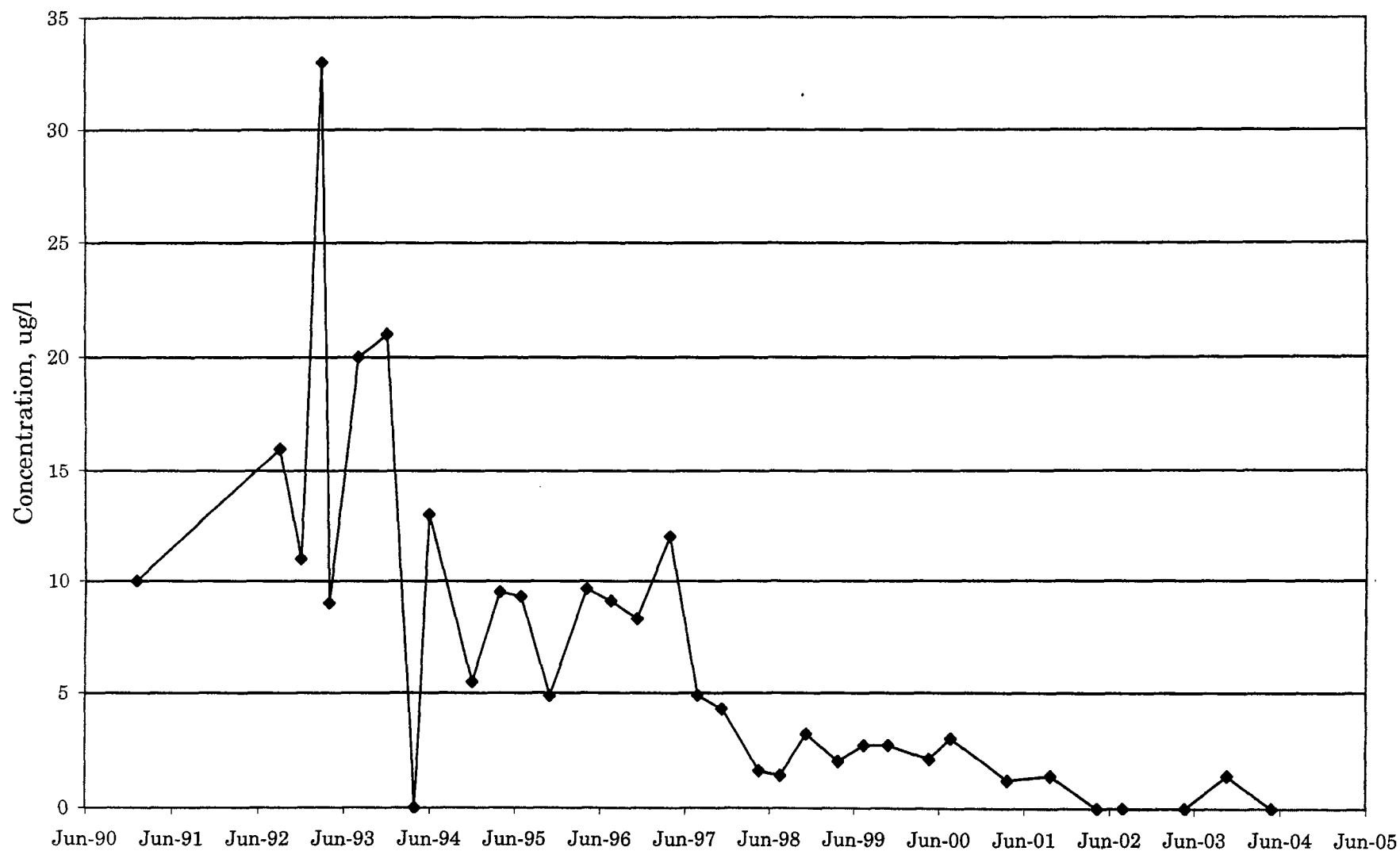
TCE Concentration Through Time at Well B-46S



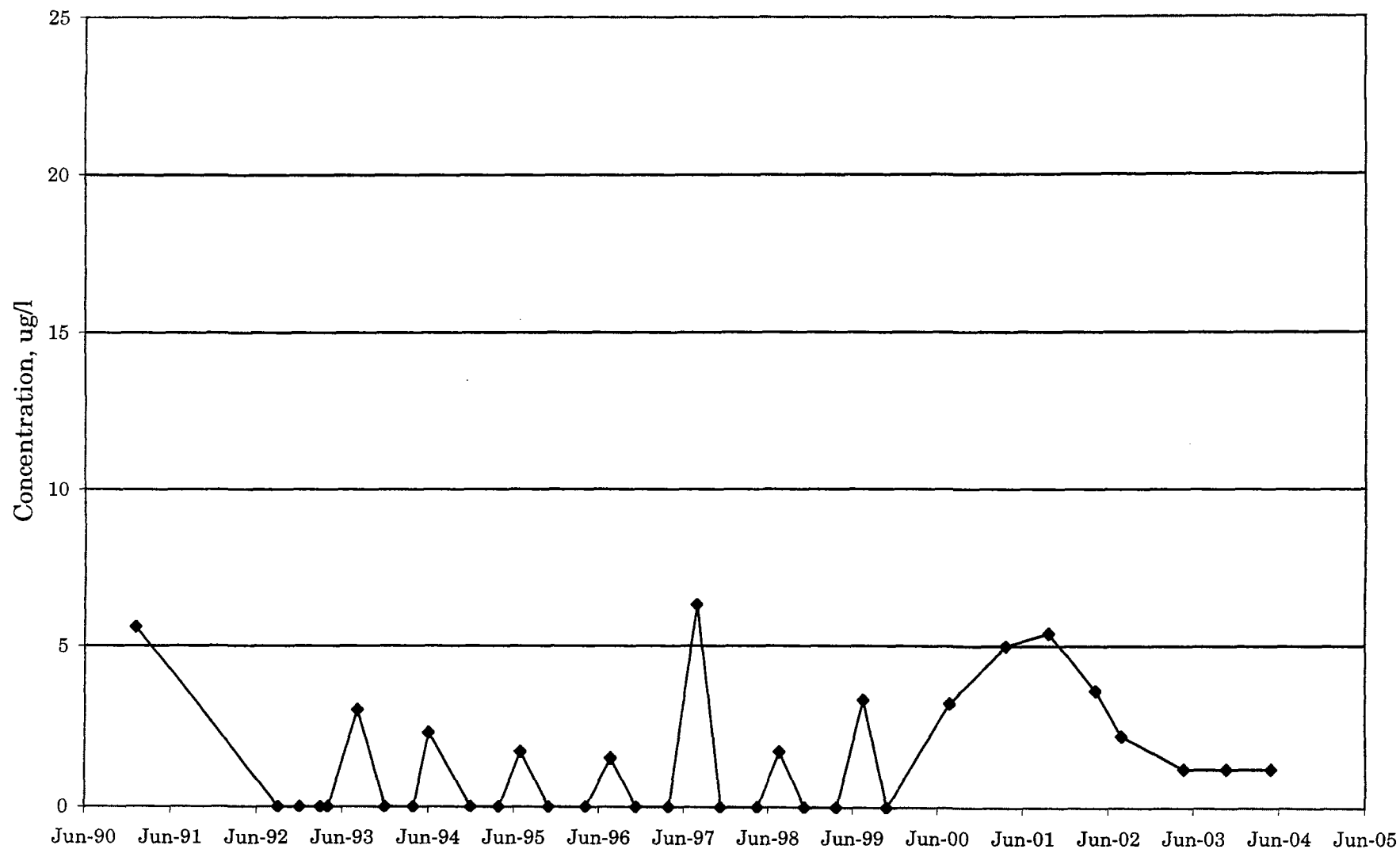
TCE Concentration Through Time at Well B-47S



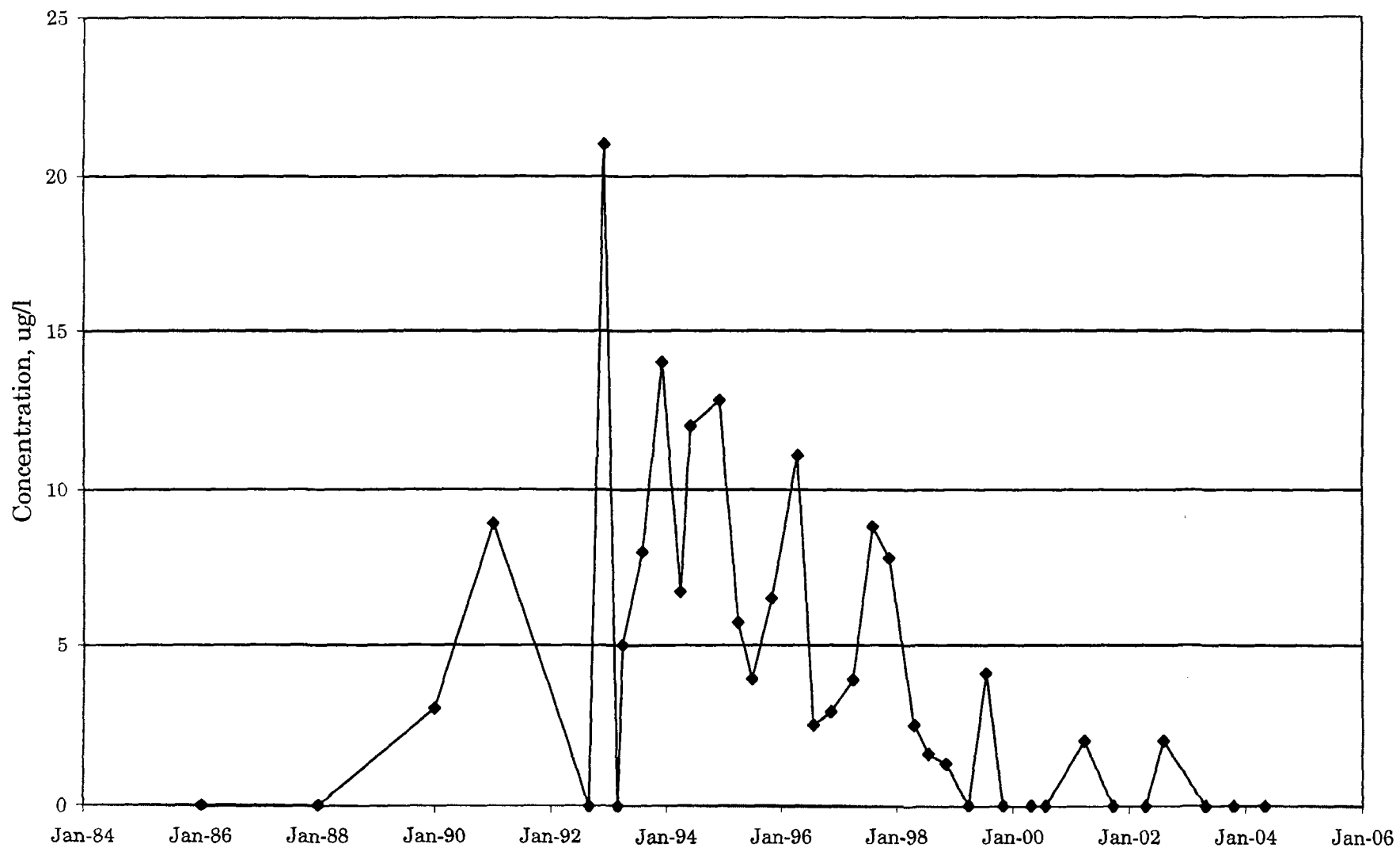
TCE Concentration Through Time at Well B-110S



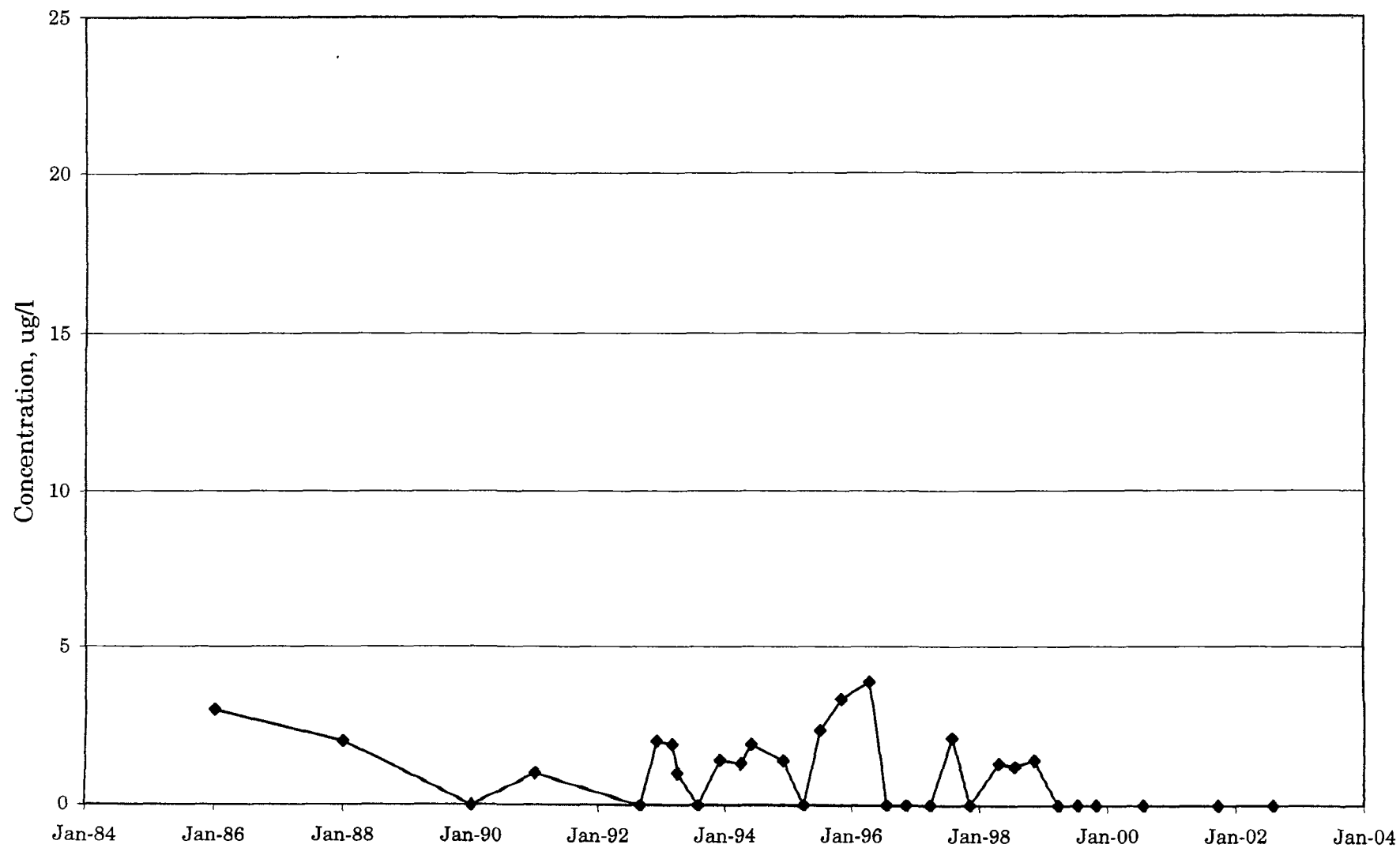
PCE Concentration Through Time at Well B-110S



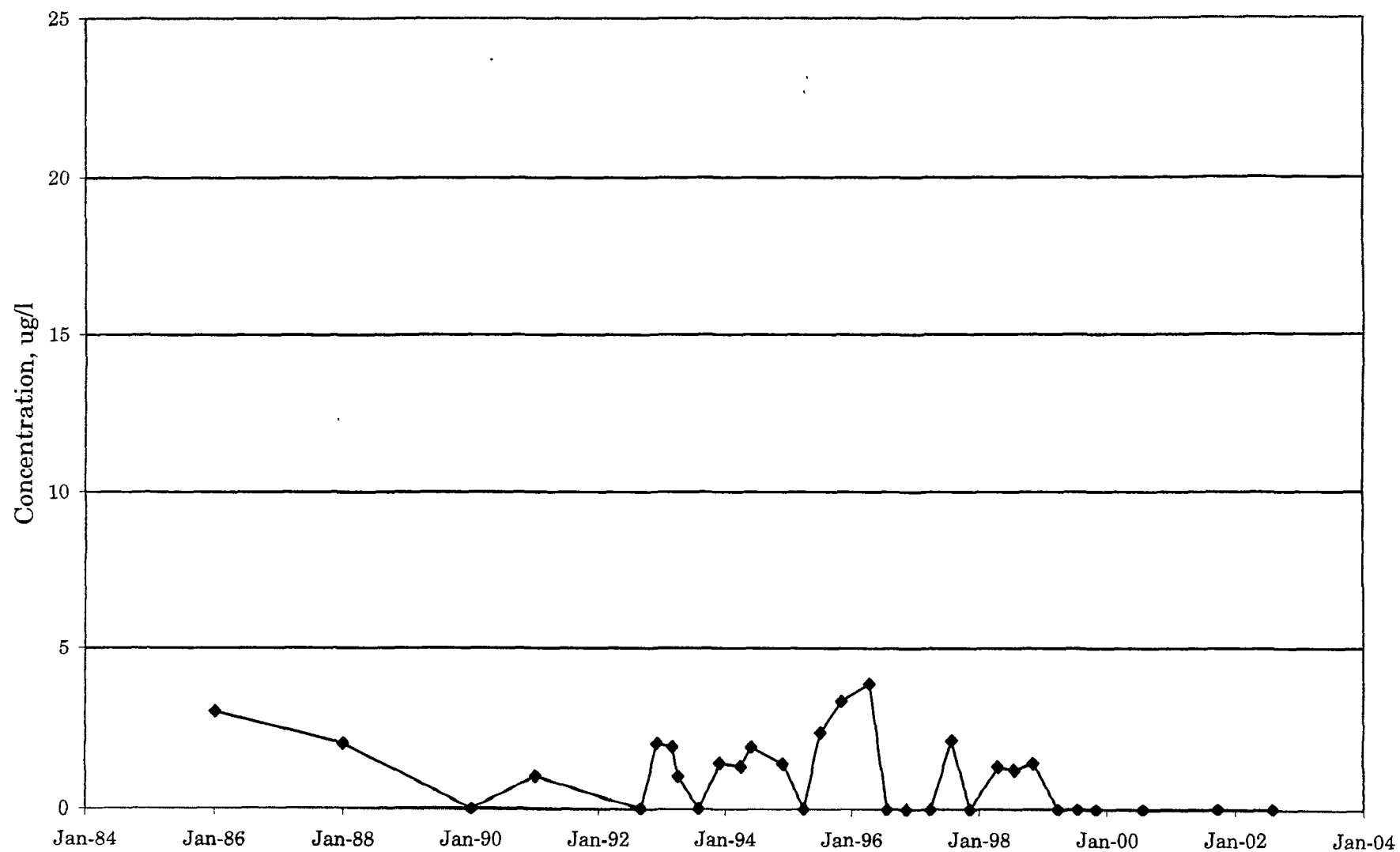
TCE Concentration Through Time at Well H-6D



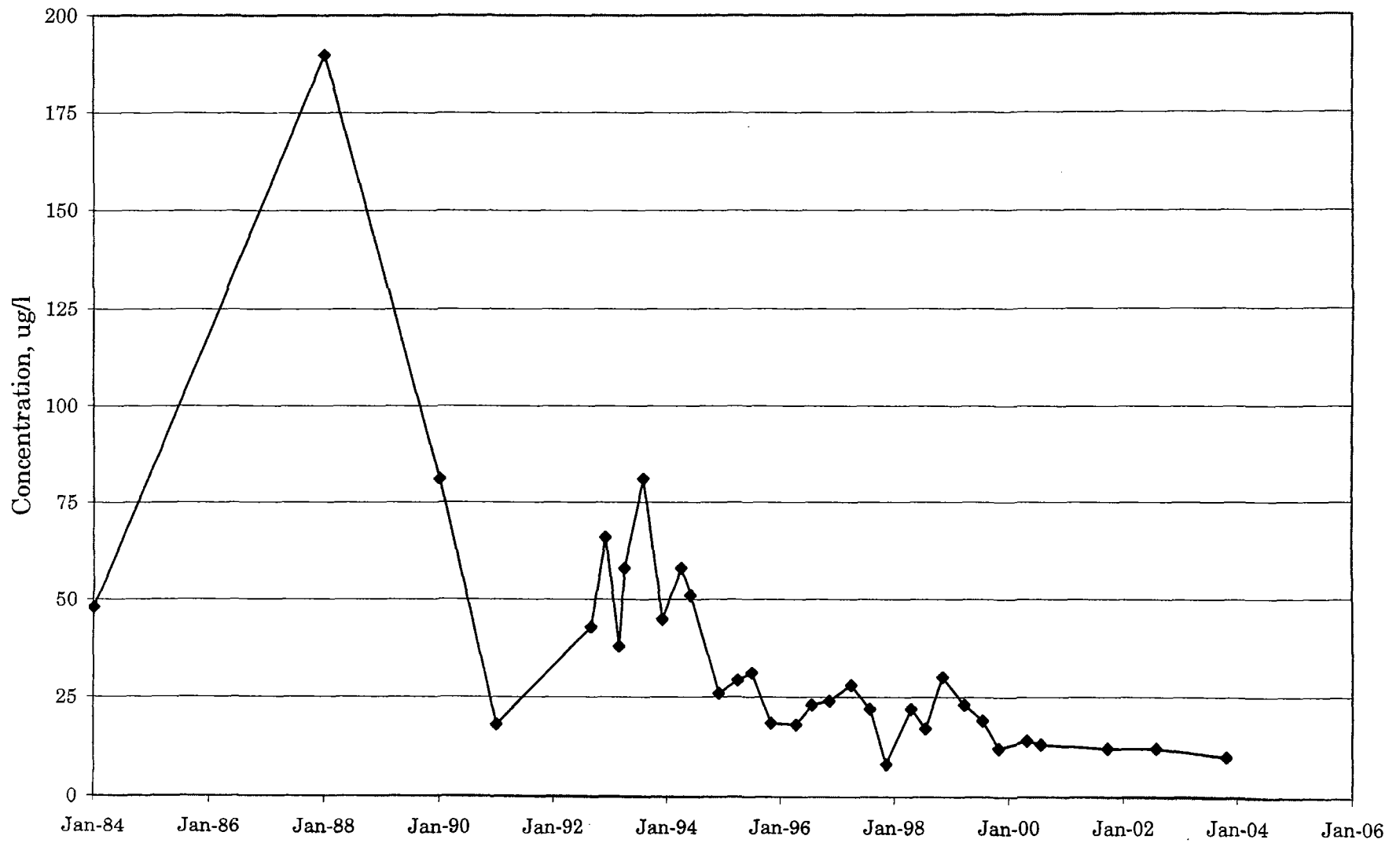
TCE Concentration Through Time at Well H-11S



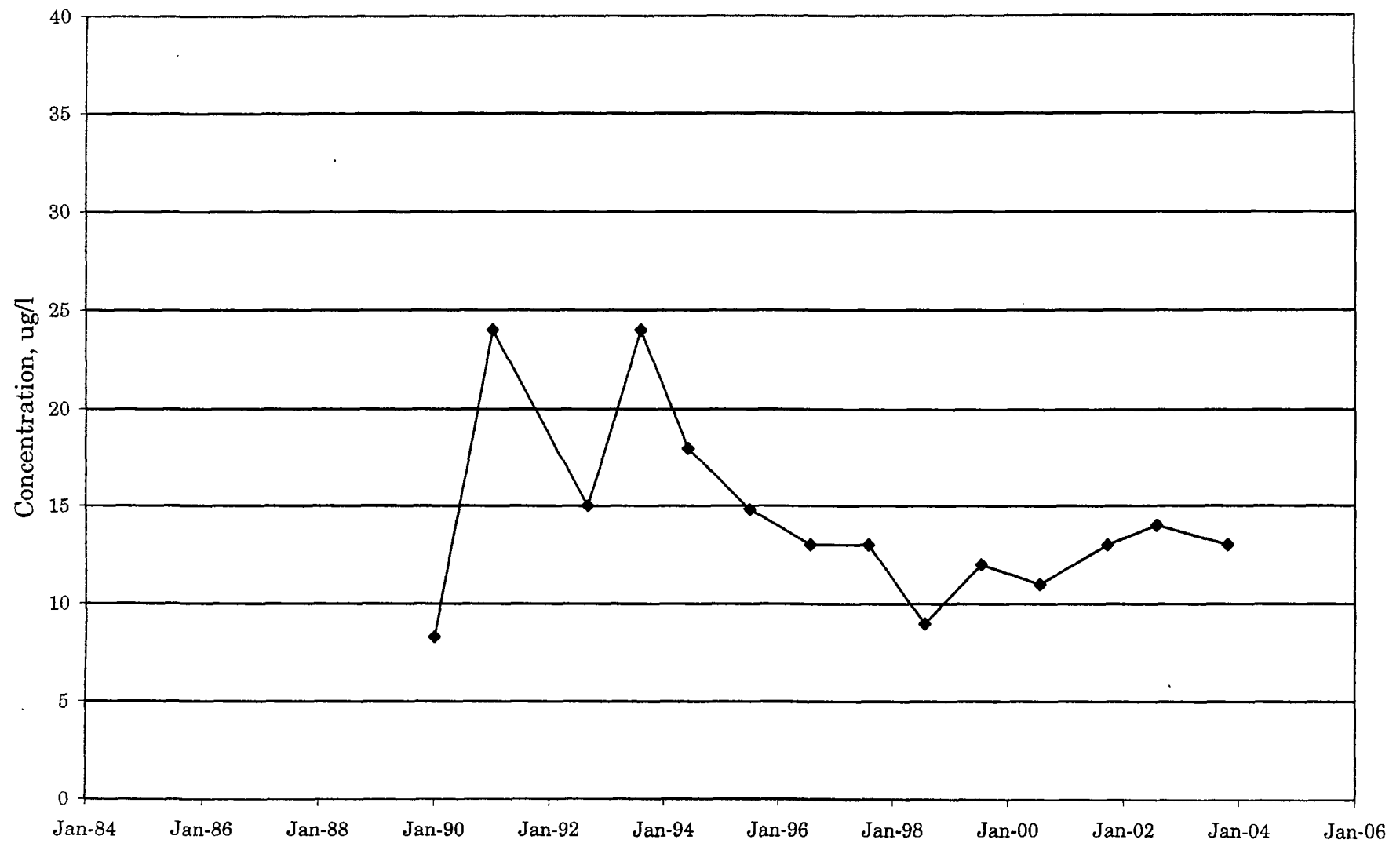
PCE Concentration Through Time at Well H-11S



TCE Concentration Through Time at Well B-45S

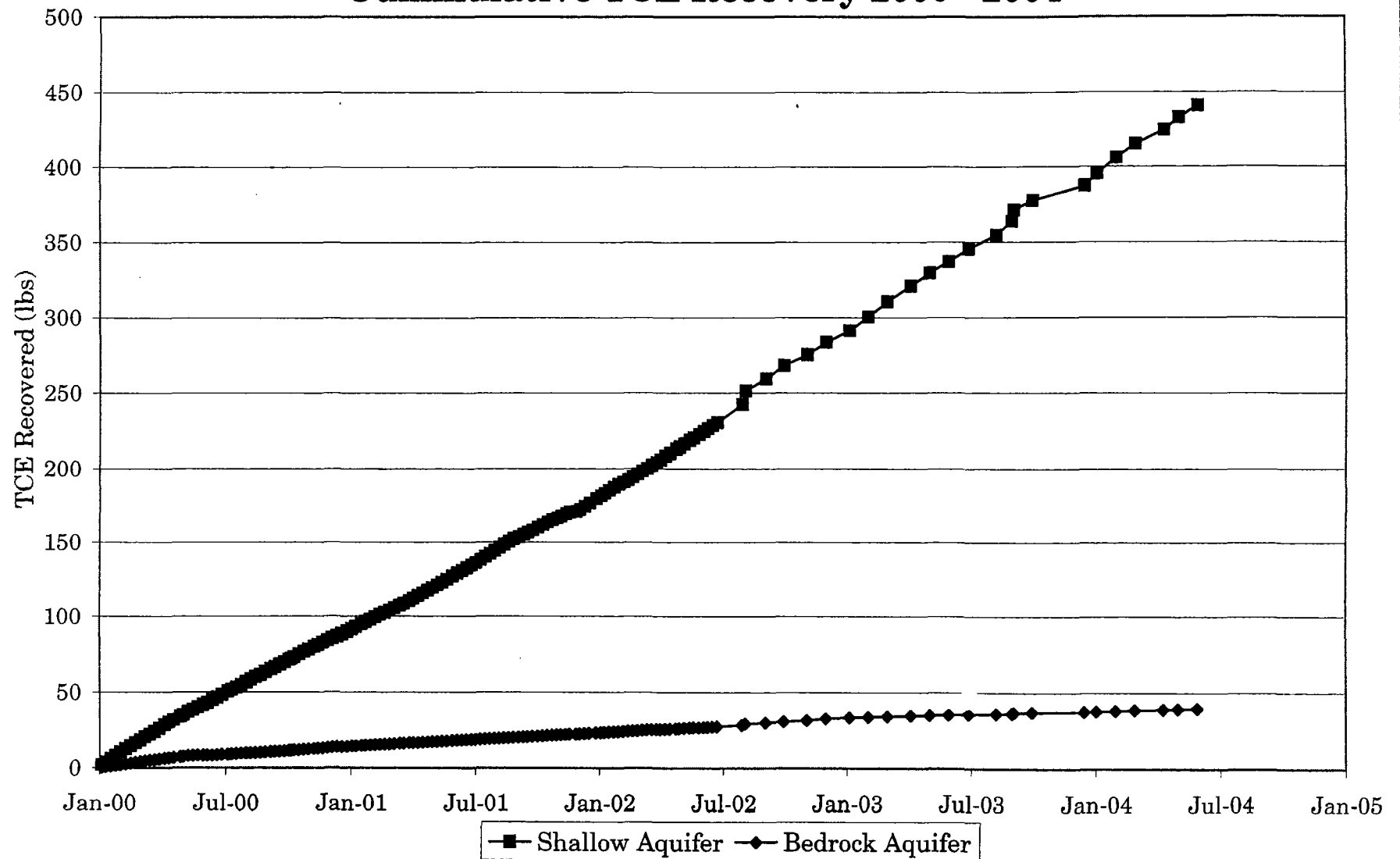


PCE Concentration Through Time at Well B-45S

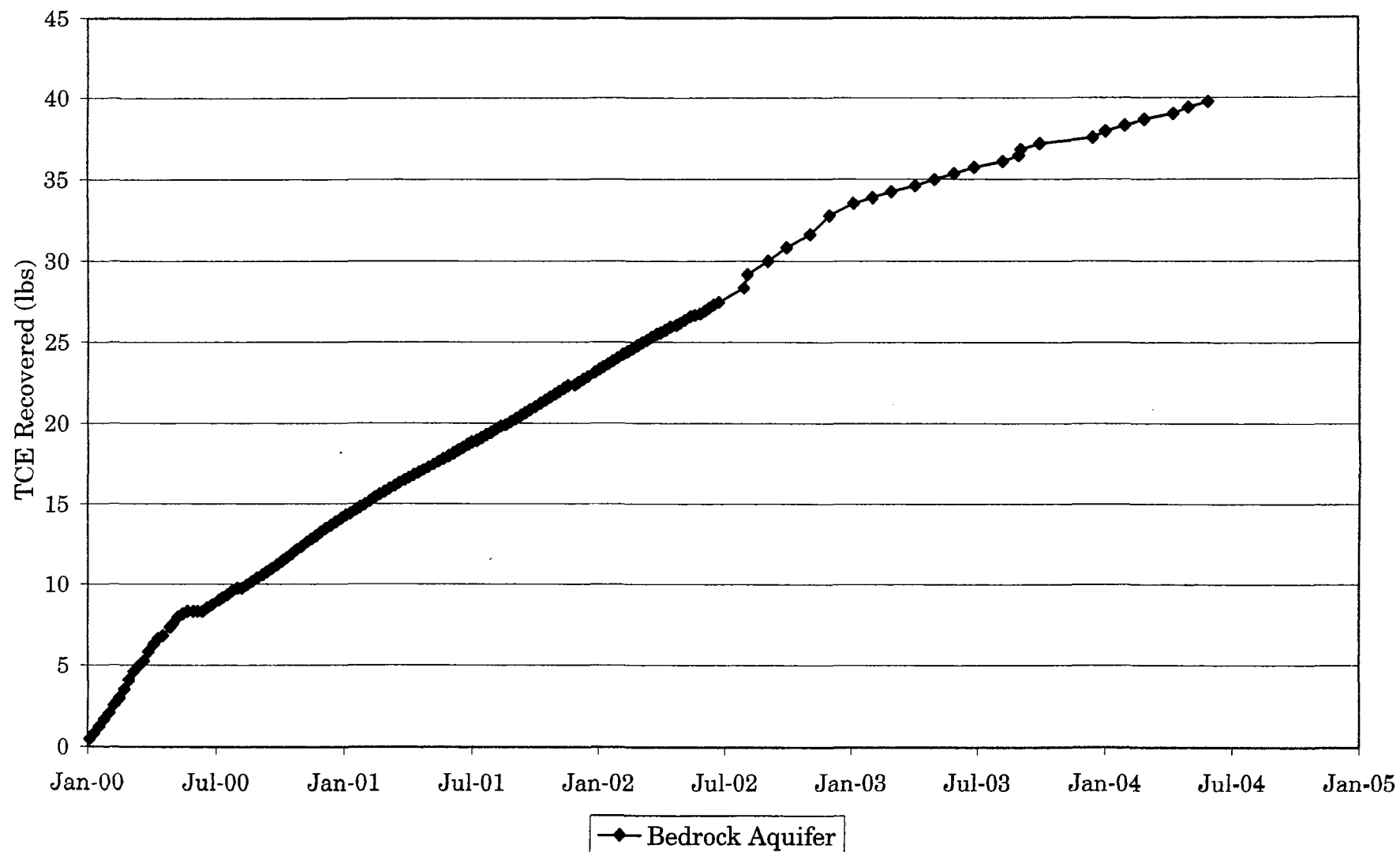


APPENDIX E
MASS REMOVAL PLOTS

Cummulative TCE Recovery 2000 - 2004



Cummulative TCE Recovery 2000 - 2004



Monthly TCE Recovery in Year 2000 - 2004

